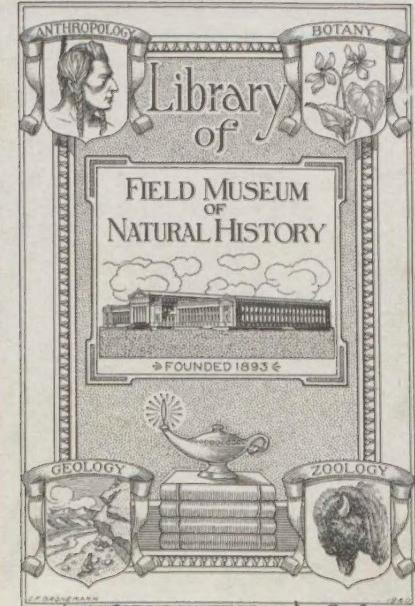


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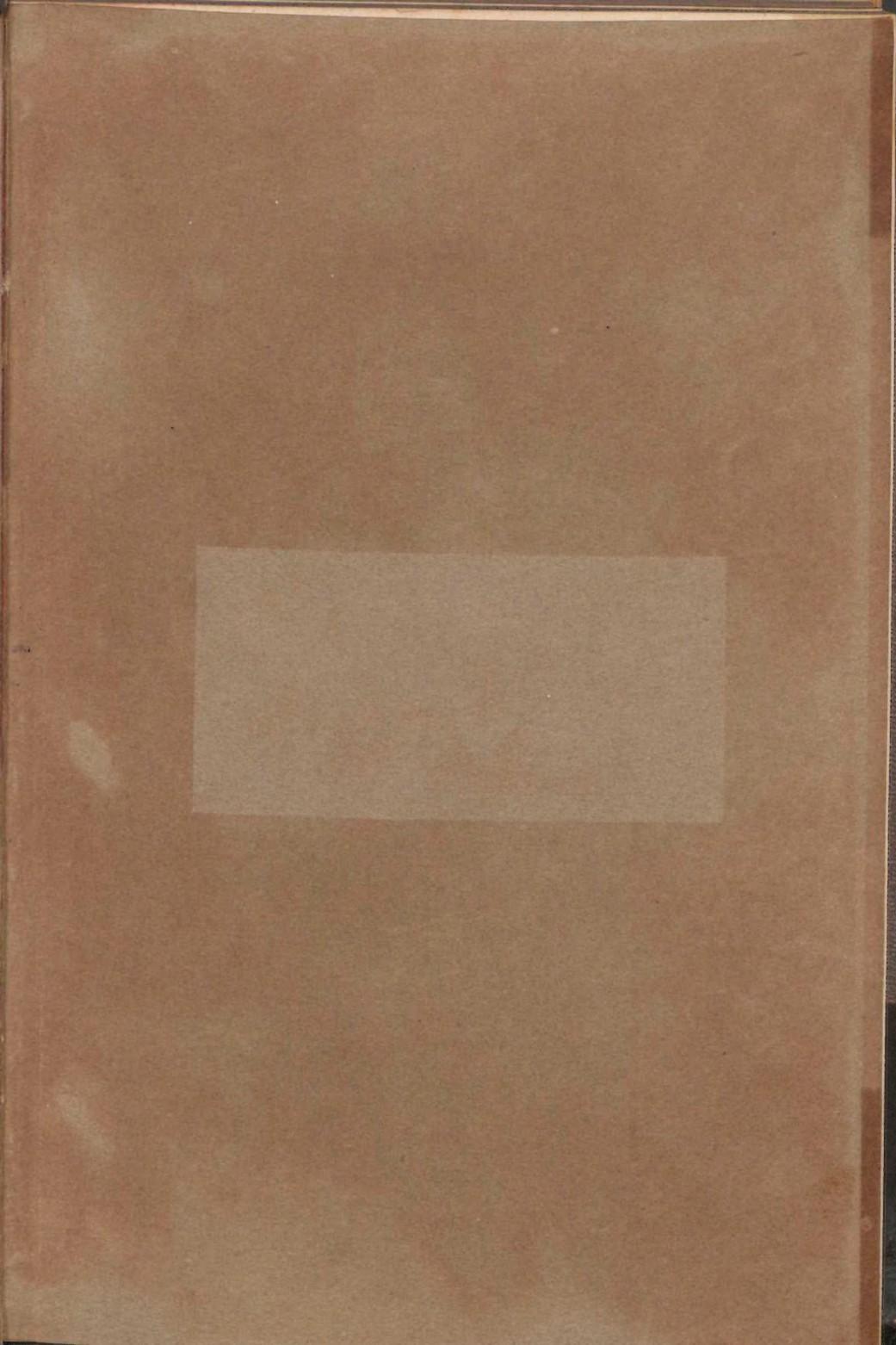


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THE
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THE
QUARTERLY JOURNAL
OF
CONCHOLOGY.

INTRODUCTION.

We are glad to find that the study of the science of Conchology is becoming much more general. We are glad because we think it possesses advantages which many other sciences only possess in a smaller degree. Its objects lie around us on every hand, on mossy banks, in glassy pools, in rustling woods, in the deep sea, and on its shore. Its spoils too, are of very varied beauty of form and colour—the houses of the Mollusca—how many, very many of our fellow-men cannot boast of houses so comfortable, so convenient, so exceeding beautiful. These spoils need no elaborate preparation on the part of the collector, nor jealous care for their preservation, a plain wood cabinet, or boxes, a small round fishing net, some chip or tin pill boxes, are all that is required.

It must not be thought that the field of study is a restricted one, for besides a knowledge of the Molluscs themselves, a practical knowledge of Botany is desirable, in order to recognize on what plants they feed, and also that by recognizing the food-plant we may be on the alert to find the animal. Then an acquaintance with Geology will show upon what soils and rocks certain species are most surely found, and it will allow of an intelligent comparison with all the myriad fossil forms; for it must be remembered that by far the largest proportion of fossil remains are molluscous. A competent knowledge of Microscopy will amply repay some amount of patience, of time, and some little cost by proving an “open sesame” to many hidden wonders. Nor should we consider the study of these lowly creatures as likely to lead to no direct useful result; for it is by the study of the lower forms of life, that we hope perhaps ultimately to discover, what is life.

In introducing the Quarterly Journal of Conchology to the public, we have been desirous of satisfying a long-felt want of students of the science. Our chief objects are two—first, to encourage and stimulate original research by freely opening our pages to all who take an interest in the science, however humble they may be, and more especially to all careful and accurate observers. Second, to bring the works of the great masters of the science within the reach of all collectors, by reprinting from time to time in our pages their more important papers which appear in the high priced publications.

In addition to these two chief objects, we shall endeavour to point out the great importance of, and to promote the study of the geographical distribution of species. By a systematic inquiry into this subject, in which but little has been done, we believe many interesting phenomena will be discovered, bearing on the habits, food, and perhaps the origin of varieties. We must strongly urge the formation of local lists in every district. We shall always be glad to make them public. We may shortly be able to propose a scheme which will give a more organized character to this important work.

We hope that our pages may also afford a means for comparing results on the part of students, for encouraging the undertaking of combined and definite work, and also afford a means of general communication.

Thus far as regards present students, but is it too much to hope that we may be the means of inducing others to take up the study? We cannot, it is true, offer any "fierce exciting joys" in its pursuit, but to those who wish a change from the bustle and haste of life, and from the feverish excitement of political and social strife, we can promise quiet, refreshing enjoyment—country rambles in the summer time—long nights in winter, arranging, studying, tabulating, and recording results, and comparing them with those of other collectors. In accepting this escape from the turmoil of ordinary life, we need not fear we shall lose our interest in our fellow men, in their well-being and progress, but we hope shall each be able to say—

"I love not man the less, but nature more
From these our interviews in which I steal
From all I was, or am, or may be, and mingle with the universe and feel
What I can ne'er express, yet cannot all conceal."

• • •

A LIST OF LAND AND FRESHWATER SHELLS
COLLECTED IN THE NEIGHBOURHOOD OF
WAKEFIELD.

By JOSEPH HEBDEN.

This List of Shells is the result of several years' collecting, and for much valuable information, I am indebted to my friends Messrs. Wm. Lund and G. Taylor, the former of whom was for many years a most assiduous and successful conchologist.

It might have been made much more extensive but for the desirability of restricting the area of the district.

Sphærium corneum L.—Common in the ponds and canals throughout the district.

Sphærium rivicola Leach.—Plentiful in the Barnsley and Stanley canals.

Sphærium ovale Ferussac.—This local species is plentiful in the canal near Stanley, and is met with more rarely in the Wakefield and Barnsley canal.

Sphærium lacustre Muller.—Occurs in the Barnsley canal, plentiful in a pond at Sandal.

Pisidium amnicum Muller.—Common in the Barnsley and Stanley canals.

Pisidium fontinale Draparnaud.—Pond at Sandal.

Pisidium fontinale var. **Henslowana** Shedd.—Barnsley canal.

Pisidium fontinale var. **pulchella**, Jenyns.—Barnsley canal.

Pisidium nitidum Jenyns.—Found in ponds throughout the district.

Unio tumidus Phillipson.—In the canal near Barnsley.

Unio tumidus var. **radiata** Jeffr.—Plentiful in the canal at Heath.

Unio pictorum L.—Moderately common in the Barnsley and Stanley canals.

Anodonta cygnea L.—Common throughout the district.

Anodonta cygnea var. **radiata** Muller.—In the lake at Nostell Priory.

Anodonta anatina L.—Occurs in the canal near Barnsley.

Anodonta anatina var. **radiata** Jeffr.—Canal, nr. Barnsley.

Dreissena polymorpha Pallas.—Plentiful in the Barnsley canal, Wintersett Reservoir, and New-miller-dam.

Neritina fluviatilis L.—Common in the Wakefield and Barnsley canal.

Paludina vivipara L.—Common in the Wakefield and Barnsley canal, and more rarely in a stream near Sandal Castle.

Bythinia tentaculata L.—Common throughout the district.

Bythinia tentaculata var. **decollata** Jeffr.—Found plentifully at Kirkthorpe.

Bythinia Leachii Shedd.—Found commonly amongst decaying sedges at the sides of the Wakefield and Barnsley canal.

Valvata piscinalis Muller.—Moderately common in the Wakefield and Barnsley canal.

Valvata piscinalis var. *subcylindrica* *Jeffr.*—River Went, near Ackworth.

Planorbis nitidus *Muller.*—Found at Kirkthorpe and Hemsworth.

Planorbis nautilus *L.*—Common at Ossett and Cold Hiendley.

Planorbis nautilus var. *cristata* *Draparnaud.*—Occurs with the type.

Planorbis albus *Muller.*—Various places round Wakefield.

Planorbis albus var. *Draparnaldi* *Shepp.*—Very fine specimens of this local variety from a pond at Sandal.

Planorbis spirorbis *Muller.*—Common throughout the district. A beautiful white variety occurs at Dircar.

Planorbis vortex *L.*—Very common throughout the district, with *P. spirorbis*.

Planorbis carinatus *Muller.*—Common in the Wakefield and Barnsley canal. A dwarf form occurs in a pond nr. Sandal Castle.

Planorbis complanatus *L.*—Common throughout district.

Planorbis corneus *L.*—Abundant in a pond at Castleford. Evidently introduced.

Planorbis contortus *L.*—Very abundant in ponds at Castleford and near Frystone Hall.

Physa hypnorum *L.*—Common in a ditch at Stanley, where the specimens are very fine; more rarely at Cold Hiendley. Very common at Horbury.

Physa fontinalis *L.*—Common in the Barnsley canal, and in nearly every stream throughout the district.

Physa fontinalis var. *oblonga* *Jeffr.*—Common in the River Went at Ackworth.

Limnæa peregra *Muller.*—In a ditch at Stanley, common.

Limnæa peregra var. *ovata* *Draparnaud.*—Barnsley canal.

Other forms of this most variable species occur throughout the district.

Limnæa auricularia *L.*—Occurs in canals at Horbury and Walton, and in the Cold Hiendley and Hemsworth dams.

Limnæa stagnalis *L.*—Barnsley canal. Very fine specimens at Kirkthorpe.

Limnæa stagnalis var. *fragilis* *L.*—Abundant in a stream near Castleford.

Limnæa palustris *Muller.*—In a pond on the canal side near Heath Bridge.

Limnæa palustris var. *elongata* *Jeffr.*—Occurs in the same pond.

Limnæa palustris var. *tincta* *Jeffr.*—Barnsley canal.

Limnæa truncatula *Muller.*—Common in ditches throughout the district.

Limnæa truncatula var. *elegans* *Jeffr.*—Standbridge, near Sandal.

Limnæa glabra *Muller.*—Very abundant in a pond at Havercroft where the specimens are small. Common near Ossett.

Limnæa glabra var. *elongata* Jeffr.—Common and very fine at Ossett, amongst which are numbers of decollated specimens.

Ancylus fluviatilis Muller.—Common at Kirkthorpe.

Ancylus fluviatilis var. *Capuloides* Jan.—This local and rare variety occurs in the River Went, near Ackworth, also in a small stream near Sandal Castle.

Ancylus fluviatilis var. *albida* Jeffr.—Pugneys.

Ancylus lacustris L.—Barnsley canal occasionally, plentiful in a pond at Cold Hiendley.

Arion ater L.—Common throughout the district.

Arion flavus Fer.—Common throughout the district.

Limax gagates Drap.—Bridge at Fall Ing.

Limax flavus L.—Common throughout the district.

Limax agrestis L.—Common.

Limax arborum Bouch.-Chant.—Occurs at Haw Park.

Limax maximus L.—Common throughout the district.

Succinea putris L.—Common throughout the district.

Succinea elegans Riso.—Common at Ackworth.

Vitrina pellucida Muller.—Common throughout district.

Zonites cellarius Muller.—Common throughout district.

Zonites alliarius Muller.—Common throughout district.

Zonites nitidulus Drap.—Common throughout district.

Zonites nitidulus var. *nitens* Michaud.—Beautiful pinkish white coloured specimens of this variety occur at Newton.

Zonites purus Alder.—Occurs at Haw Park.

Zonites purus var. *margaritacea* Jeffr.—Common throughout the district.

Zonites radiatulus Alder.—Rare at Sandal Castle.

Zonites nitidus Muller.—Stanley and Cold Hiendley, locally abundant.

Zonites excavatus Bean.—Common at Haw Park and at Bulcliffe Wood.

Zonites crystallinus Muller.—Common throughout district.

Zonites fulvus Muller.—Scarce throughout the district.

Helix aculeata Muller.—Common at Haw Park, and occurs sparingly throughout the district.

Helix aspersa Muller.—Common throughout the district.

Helix nemoralis L.—Common throughout the district.

Helix nemoralis var. *hortensis* Muller.—Common throughout the district.

Helix nemoralis v. *hybrida* Poi.—Occasionally at Newton.

Helix nemoralis var. *major* Fer.—Chevet, rare.

Helix nemoralis var. *minor* Jeffr.—Rather common at Stanley.

Helix Cantiana Montagu.—Canal side near Walton, and at Chevet Lane. At the latter locality specimens are scarcer and of less size than formerly.

Helix rufescens Pennant.—Common throughout district.

Helix rufescens var. *albida* Jeffr.—Very rare, one specimen near Crofton Station.

Helix rufescens var. minor Jeffr.—Rather common nr. Chevet.
Helix hispida L.—Common throughout the district.

Helix virgata Da Costa.—Very local, only occurring on and about a railway bridge near Oakenshaw.

Helix caperata Mont.—Common throughout the district.

Helix caperata var. ornata Picard.—Occurs along with the type, frequently.

Helix caperata var. subscalaris Jeffr.—Rare, one specimen on Sandal Castle Hill.

Helix caperata var. Gigaxii Charp.—Frequently met with in Chevet Lane.

Helix erickerorum Muller.—Sandal Castle Hill, where I also found a scalariform specimen.

Helix rotundata Muller.—Common throughout the district.

Helix rotundata var. alba Moquin-Tandon.—My friend, Mr. G. Taylor, has taken three specimens of this rare variety near Ossett.

Helix pygmaea Drap.—Scarce at Haw Park and other places in the district.

Helix pulchella Muller.—Common in a quarry at Oakenshaw and New-miller-dam.

Helix pulchella var. costata Muller.—Occurs plentifully with the type at Oakenshaw.

Bulinus obscurus Muller.—Rare at Sandal Castle Hill.

Vertigo pygmaea Drap.—Rare, occurs at Dintear, where the specimens have four teeth.

Clausilia rugosa Drap.—Occurs at Sandal, Newmarket, and Woodlesford.

Cochlicopa lubrica Muller.—Haw Park.

Cochlicopa lubrica var. lubricoides Fer.—Haw Park and Sandal Castle Hill.

Acme lineata Drap.—Living specimens of this rare Mollusk were found in decaying timber on the canal side, near Haw Park, by myself and Mr. Wm. Lund.

SANDAL COMMON, Near Wakefield, Dec. 26th, 1873.

On Varieties of *Paludina vivipara* and *Planorbis glaber*.—Having been so fortunate during the past year as to find a new and distinct variety of each of these fresh-water Shells, which have been kindly determined for me by Mr. J. G. Jeffreys, F.R.S., I send a description of them for the information of your readers.

PALUDINA VIVIPARA var. *ATRO-PURPURA*.—Shell same shape as the normal form, but of a black colour, which, when viewed by transmitted light, is dark purple, being in fact the same colour as the bands of other specimens which occur with it. I found it in the canal at Pontypool this spring in numbers, together with the type and the variety *unicolor*; and besides this, there were with them all intermediately coloured ones, between *unicolor* and *atro-purpurea*; these evidently being the ends of a series, *unicolor* being that in which all traces of the bands have vanished, and *atro-purpurea* that in which they have so spread themselves as to have entirely obliterated all traces of the green ground colour of the typical shell.

PLANORBIS GLABER var. **COMPRESSA**—Shell more concave below than in the type, and only depressed in the centre on the upper side, the whorls also are rounder and do not increase so quickly, making the whole shell more compact. Found in the neighbourhood of Birmingham.—R. M. LLOYD, 62, Villa-road, Handsworth, Birmingham, December 18th, 1873.

**ON THE OCCURRENCE OF *COCHLICOPA TRIDENS*
VAR *CRYSTALLINA*, DUPUY, IN THE NEIGHBOURHOOD OF BIRMINGHAM.**

By G. SHERIFF TYE.

Any interested reader turning to page 291, vol. I. of Mr. Jeffreys' "British Conchology," will there find recorded the occurrence of this lovely little shell at Wenley Castle. [In Mr. Jeffreys' book spelt "Wheleby."] I believe the original spot from whence the shells here indicated were taken, is in a garden now attached to a farm-house. A short distance from this spot my friend Mr. Nelson, after diligent search, was rewarded by finding two or three shells, shewing much to our mutual satisfaction, that this charming variety still inhabits the locality.

Having hitherto looked upon it as a rarity, I consider myself fortunate in having since found it in three other places in the Birmingham district. First at Perry Bar, secondly at Hamstead, at the former place I found an interesting variety of a pale whitish yellow colour, more opaque than *crystallina*, but brilliant. Hamstead furnished the greatest number of the crystalline variety. My friends, Messrs. Nelson and Lloyd and myself, obtained amongst us nearly two dozen shells, yet left many young to furnish a progeny for future collectors.

The third habitat is Dudley, where, on a pleasant day in April this year, Mr. Lloyd and myself found it in company with *C. tubricia* and *Carychium minimum* in the still romantic grounds of Dudley Castle.

These three localities are all in the county of Stafford, and their distance from Birmingham is as follows:—Perry Bar, $\frac{1}{2}$ miles; Hamstead, $2\frac{1}{2}$ miles; Dudley about 8 miles. Wenley Castle is in Worcestershire, and is situated about $4\frac{1}{2}$ miles from Birmingham.

A single specimen has also been taken by Mr. Shrive, near Knowle, Warwickshire.

C. tridens is distributed throughout the neighbourhood of Birmingham, occurring abundantly in many places and sparingly in others: indeed a collector searching for it in almost any "likely looking" locality would hardly be disappointed, yet it appears to be much less plentiful in other districts.

It would be interesting to learn the distribution of this species in Great Britain. The records of its occurrence in our eastern counties are rare, and it is doubtful whether it inhabits Scotland or Ireland. Mr. Jeffreys has recorded one locality for it in Wales.

It may be looked for at the roots of grass (*i.e.*, at the base of the blades) or in the middle of thick tufts, among moss, or under

herbage or stones in rather damp places "all the year round," but early in the year, if the weather be mild, is the best time, before vegetation gets too luxuriant and Phœbus too powerful, for our little *Cochlicopa*, like many others of our native mollusks, is no "feather-bed soldier" but bestirs himself ere yet the last snow has departed before the soft breath of spring.

Unlike its brother *C. lubrica*, *C. tridens* has a limited foreign distribution, being only reported from France and Germany, while the former has a world-wide distribution.

HANDSWORTH, December 18th, 1873.

THE MOLLUSCA OF EUROPE COMPARED WITH THOSE OF EASTERN NORTH AMERICA.

By J. GWYN JEFFREYS, F.R.S.

[Reprinted, by the kind permission of the Author, from the ANNALS
AND MAGAZINE OF NATURAL HISTORY FOR October, 1872.]

After mentioning that he had dredged last autumn on the coast of New England in a steamer provided by the Government of the United States, and that he had inspected all the principal collections of Mollusca made in Eastern North America, the author compared the Mollusca of Europe with those of Massachusetts. He estimated the former to contain about 1000 species (viz. 200 land and freshwater, and 800 marine), and the latter to contain about 400 species (viz. 110 land and freshwater, and 290 marine); and he took Mr. Binney's edition of the late Professor Gould's 'Report on the Invertebrata of Massachusetts,' published in 1870, as the standard of comparison. That work gives 401 species, of which Mr. Jeffreys considered 41 to be varieties and the young of other species, leaving 360 apparently distinct species. About 40 species may be added to this number in consequence of the recent researches of Professor Verrill and Mr. Whiteaves on the coast of New England and in the Gulf of St. Lawrence. Mr. Jeffreys identified 173 out of the 360 Massachusetts species as European, viz., land and freshwater 39 (out of 110), and marine 134 (out of 250), the proportion in the former case being 28 per cent., and in the latter nearly 54 per cent.; and he produced a tabulated list of the species in support of his statement. He proposed to account for the distribution of the North-American Mollusca thus identified, by showing that the land and freshwater species had probably migrated from Europe to Canada through Northern Asia, and that most of the marine species must have been transported from the Arctic seas by Davis's Strait current southwards to Cape Cod, and the remainder from the Mediterranean and western coasts of the Atlantic by the Gulf-stream in a northerly direction. He renewed his objection to the term "representative species." The author concluded by expressing his gratitude for the kind hospitality and attention which he received from naturalists during his visit to North America last year.

Mollusca of Eastern North America, according to Binney's edition of Gould's 'Invertebrata of Massachusetts.'

Page.	Name of Species.	N. or S. of Cape Cod.	European.	Synonyms and Remarks.
28	Teredo navalis, Linne ...	N	E	Wood's Hole, Mass., J. G. J.
29	..... Norvegica, Spengler ...	N	E	
30	..... megotara, Hanley ...	N	E	
31	..... Thompsonii, Tryon ...	S		
32	..... dilatata, Simpson ...	N		<i>T. miscellata</i> , variety.
33	..... chlorotica, Gould (1870) ...	N	E	<i>T. pedicellata</i> , Quatrefages [1849], var.
34	Xyletia familiaris, Jeffreys ...	S		
36	Pholas costata, L. ...	S		
38	.... truncata, Say ...	S		
39	Zirfaea crispata, L. ...	N	E	Genus <i>Pholas</i> .
40	Solen ensis, L. ...	N	E	
43	Solecurtus gibbus, Sp. ...	S		
44	.... divisus, Sp. ...	S		
46	Machæra squama, Blainville ...	N		<i>G. Siligua</i> .
47	.... costata, Say ...	N		<i>G. Siligua</i> .
48	Solemya velum, Say (1822) ...	N		<i>S. togata</i> , young.
50	.... borealis, Totten (1834) ...	N	E	<i>S. togata</i> , Poli, 1791.
51	Panopaea arctica, Lamarck (1818) ...	N	E	<i>Saxifraga Norvegica</i> , sp. 1793.
53	Glycymeris siliqua, Chemnitz ...	N	E	<i>G. Cyrtodaria</i> .
55	Mya arenaria, L. ...	N	E	
58	.... truncata, L. ...	N	E	
60	Corbula contracta, Say ...	S		
61	Neæra pellucida, St. ...	N	E	
62	Pandora trilineata, Say ...	N		
64	Lyonsia hyalina, Conrad ...	N		Allied to <i>L. Norvegica</i> .
65	... arenosa, Miller ...	N	E	
66	Anatina papyracea, Say ...	N		
68	Cerithium Lemaire, Conrad	N		Allied to <i>Thracia postenni</i> , which is European.
69	Thracia Conradi, Couthouy (1838) ...	N		<i>T. inflata</i> , J. Sowerby, 1845.
71	.... myopsis (Beek) Mill (1842) ...	N	E	<i>T. truncata</i> , Brown, 1827.
72	.... truncata, Mighels & Adams (1842) ...	N	E	Not <i>T. truncata</i> , Br. <i>T. septentrionalis</i> , Jesfr. AS.
73	Mactra solidissima, Ch. ...	N		Loven received a single valve from Finmark.
75	.... ovalis, Gould ...	N		<i>M. solidissima</i> , var.
77	.... lateralis, Say ...	N		Allied to <i>M. subtruncata</i> , which is European.
79	Cumingia tellinoides, Conr. ...	S		
80	Ceronia arctata, Conr. ...	N		<i>Mesodesma deauratum</i> , var.
81	.... deaurata, Turton ...	N		<i>G. Mesodesma</i>
83	Kellia planulata, St. ...	N		<i>G. Lasva</i> .
83	.... suborbicularis, Montagu ...	N	E	
85	Turtenia minuta, Fabricius ...	N	E	<i>G. Cyamium</i> .
86	Montacuta elevata, St. ...	N	E	
87	Saxicava rugosa, Pennant ...	N	E	Linne instead of Pennant.
89	.... arctica, L. ...	N		<i>S. rugosa</i> , var.
90	Fenicula phædriiformis, Lam. ...	N		Valentia, Ireland; fragment.
92	.... dactylus, Say ...	N		<i>P. phædriiformis</i> , var.
93	Macoma fusca, Say (1826) ...	N	E	<i>Tellina Balthica</i> , L., 1766.
95	.... proxima, Gray (1839) ...	N	E	<i>T. ciliaria</i> , Ch., 1782.
96	Tellina tenta, Say ...	S		
97	.... tenera, Say ...	N		Allied to <i>T. tenuis</i> .
98	Lucina filosa, St. (1851) ...	N	E	<i>L. borealis</i> , L., 1766.

Page.	Name of Species.	N. or S. Cape Cod	European.	Synonyms and Remarks.
99	Lucina dentata, <i>Wood</i> ...	S		
100	Cryptodon Gouldii, <i>Phil.</i> (1845)	N	E	<i>Axinus flexuosa</i> Mont., var. 1803.
101	Sphaerium simile, <i>Say</i> (1816) ...	N		<i>S. striatum</i> , Lam., 1818.
103	..... partumeium, „ (1822) ...	N	E	<i>S. lacustre</i> , Muller, 1774.
104	..... rhomboideum, „ ...	N		Allied to <i>S. cornuum</i> ,
105	..... Vermontanum, <i>Prime</i> (1861) ...	N	E	which is European. <i>S. pisidioides</i> , Gray, 1856. Perhaps introduced into England.
106	..... truncatum, <i>Linsley</i> ...	N		<i>S. lacustre</i> , var.
107	..... tenuis, <i>Prime</i> ...	N		
107	..... securis, „ ...	N		<i>S. lacustre</i> , var. <i>Rykholii</i>
108	..... occidentale, „ ...	N		
109	Pisidium dulium, <i>Say</i> (1816) ...	N	E	<i>P. amnicum</i> , Mull. 1774.
110	..... Adamsii, <i>Prime</i> (1851) ...	N	E	<i>P. fontinale</i> Draparnaud, [1805.
110	..... compressum, „ ...	N		Allied to <i>P. nitidum</i> , which is European.
112	..... aequilaterale, „ ...	N		<i>P. pusillum</i> , var. <i>obtusalis</i> <i>P. pusillum</i> , Gmelin, 1788
113	..... ferrugineum, <i>Prime</i> ...	N		Possibly some of these North American species may be reduced in number.
113	..... abditum, <i>Hallman</i> (1841) ...	N	E	Perhaps a variety of <i>A. borealis</i> , Ch.
115	..... variabile, <i>Prime</i> ...	N		Including <i>A. undata</i> , Gould = <i>A. Omalii</i> , J. Sow.
116	..... ventricosum, „ ...	N		<i>A. borealis</i> , Ch., 1784 var.
117	Astarte castanea, <i>Say</i> ...	N		<i>A. castanea</i> , var. <i>nana</i> .
119	..... sulcata, <i>Da Costa</i> ...	N	E	<i>A. sulcata</i> , var.
121	..... semisulcata, <i>Leach</i> (1817) ...	N	E	<i>A. compressa</i> , Mt. 1803 var.
123	..... quadrans, <i>Gould</i> ...	N		<i>A. depressa</i> , Br., 1827.
124	..... elliptica, <i>Hanley</i> ...	N		<i>A. compressa</i> , var.
125	..... Banksii, <i>Leach</i> (1817) ...	N	E	<i>G. Crassatella</i> .
126	..... crebricostata, <i>Forbes</i> (1847) ...	N		
127	Astarte Portlandica, <i>Mighels</i> ...	N		
128	Gouldia mactracea, <i>Linsley</i> ...	N		
129	Cyprina Islandica, <i>L.</i> ...	N		
131	Cytherea convexa, <i>Say</i> ...	N		
133	Venus mercenaria, <i>L.</i> ...	N		
135	..... notata, <i>Say</i> ...	N		<i>V. mercenaria</i> , var.
136	Tapes fluctuosa, <i>Gould</i> ...	N	E	<i>G. Venus</i> .
137	Gemma gemma, <i>Totten</i> ...	N		<i>V. mercenaria</i> , young.
138	..... Manhattensis, <i>Prime</i> ...	N		
139	Cardium Islandicum, <i>L.</i> ...	N	E	
141	..... elegantulum, (<i>Beek</i>), <i>Möll.</i> ...	N	E	
143	Liocardium Mortoni, <i>Conr.</i> ...	N		<i>G. Cardium</i> .
144	Aphrodisia Greenlandica, <i>Ch.</i> ...	N	E	
146	Cardita borealis, <i>Conr.</i> (1830) ...	N	E	<i>C. sulcata</i> , Bruguiere, 1792 * [var.]
147	Arca pexata, <i>Say</i> ...	N		<i>A. pexata</i> , var.
148	..... transversa, <i>Say</i> ...	N		
149	Nucula tenuis, <i>Mont.</i> ...	N	E	
150	..... proxima, <i>Say</i> ...	N		<i>N. tenuis</i> , var.
152	..... expansa, <i>Reeve</i> ...	N		
153	..... delphinodata, <i>Migh</i> ...	N	E	<i>V. articula</i> , Sars. <i>G. Leda</i> .
154	Voldia limatula, <i>Say</i> (1831) ...	N	E	Allied to <i>Leda lucida</i> , which is European.
155	..... obesa, <i>St.</i> ...	N		
156	..... siliqua, <i>Reeve</i> (1855) ...	N	E	<i>L. arctica</i> , Gray, 1819.
157	..... thraex formis, <i>Seaver</i> ...	N	E	<i>G. Leda</i> .

Page.	Name of Species.	N. or S. of Cape Cod.	European.	Synonyms and Remarks.
159	<i>Yoldia sapotilla</i> , Gould (1841) .	N	E	<i>L. hyperborea</i> , Lov. 1846.
160	..... <i>myalis</i> , Couth .	N	...	<i>G. Leda</i> .
161	<i>Leda tenuisoleata</i> , Couth (1838)	N	E	<i>L. fernula</i> , Mull. 1770, var.
163	..... <i>Jacksonii</i> , Gould ...	N	...	<i>L. fernula</i> , var.
164	..... <i>minuta</i> , Fabr.	N	E	Mull. instead of Fabr.
165	..... <i>caudata</i> , Donovan ..	N	...	<i>L. minuta</i> , var.
167	<i>Unio complanatus</i> , Solander ..	N	...	
169	..... <i>nasutus</i> , Say ...	N	...	
170	..... <i>radiatus</i> , Gm.	S	...	
172	..... <i>cariosus</i> , Say ..	S	...	
173	..... <i>ochraceus</i> , Say ..	S	...	Perhaps <i>U. cariosus</i> , var.
174	<i>Margaritana arcuata</i> , Bar. (1823)	N	E	<i>Unio margaritifer</i> , L. 1766
176	..... <i>undulata</i> , Say ...	S	...	<i>G. Unio</i> .
177	..... <i>marginata</i> , Gould ..	S	...	<i>G. Unio</i> .
178	<i>Anodonta fluvialis</i> , Lea ..	S	...	Dillwyn, 1817 instead of Lea. <i>Anodonta cygnea</i> L. 1766
180	..... <i>implicata</i> , Say ...	N	...	<i>G. Anodonta</i> . <i>A. cygnea</i> var.
182	..... <i>undulata</i> , Say ...	S	...	<i>G. Anodonta</i> .
183	<i>Mytilus edulis</i> , L.	N	E	
186	<i>Modiola modiolus</i> , L.	N	E	<i>G. Mytilus</i> .
188	..... <i>plicatula</i> , Lam.	N	...	<i>G. Mytilus</i> .
190	<i>Modiolaria nigra</i> , Gray ...	N	E	
192	..... <i>discors</i> , L.	N	E	
193	..... <i>corrugata</i> , St.	N	E	
194	<i>Crenella glandula</i> , Tott.	N	...	
195	..... <i>pectinula</i> , Gould (1841) ..	N	E	<i>C. fava</i> , Fabr., 1780.
196	<i>Pecten tenuicostatus</i> , Migh. & Ad.	N	...	
198	..... <i>Islandicus</i> , Müll ...	N	E	
199	..... <i>irradians</i> , Lam.	N	...	
200	..... <i>tuscus</i> , Linsl.	N	...	<i>P. irradians</i> , young.
202	<i>Ostrea Virginiana</i> , Lister	N	...	
203	..... <i>borealis</i> , Lam.	S	...	<i>O. Virginiana</i> , var.
204	<i>Anomia ephippium</i> , L.	N	E	
204	..... <i>aculeata</i> , Gm.	N	...	<i>A. ephippium</i> , var.
205	..... <i>electrica</i> , L.	N	...	<i>A. ephippium</i> , var.
206	..... <i>squamula</i> , L.	N	...	<i>A. ephippium</i> , young.
208	<i>Terebratula septentrionalis</i> Couth (1839) ...	N	E	<i>Terebratula caput-serpentis</i> ,
210	<i>Rhynchonella psittacea</i> , Gm.	N	E	[L., 1764, var.]
211	<i>Waldheimia cranium</i> , Gm.	N	E	Mull. instead of Gm. <i>G. Terebratula</i> .
213	<i>Philine sinuata</i> , St. ...	N	...	Allied to <i>P. nitida</i> , which
213	..... <i>quadrata</i> , S. Wood ..	N	E	[is European.]
214	..... <i>lineolata</i> , Couth (1839) ...	N	E	<i>P. lima</i> , Br., 1827.
215	<i>Scaphander puncto-striatus</i> , Migh. & Ad. (1842) ...	N	E	<i>S. librarius</i> , Lov., 1846.
216	<i>Diaphana hemimlis</i> , Couth (1839)	N	E	<i>Utriculus globosus</i> Lov. 1840
216	..... <i>debilis</i> , Gould (1840) ...	N	E	<i>Utriculus hyalinus</i> , Turt., 1834.
217	<i>Utriculus Gouldii</i> , Couth. (1839)	N	E	<i>U. turritus</i> , Moll., 1842.
218	..... <i>pertenuis</i> , Migh. ...	N	...	<i>U. Gouldii</i> , young.
219	..... <i>canaliculatus</i> , Say ...	S	...	
220	<i>Cylichna alba</i> , Br.	N	E	
221	..... <i>oryza</i> , Tott. (1835)	N	E	<i>Bulla utriculus</i> , Brocchi, [1814.]
222	<i>Bulla incincta</i> , Migh.	N	...	
222	..... <i>solitaria</i> , Say ...	S	...	
223	..... <i>occulta</i> , Migh. & Ad. (1842)	N	E	<i>Cylichna striata</i> , Br., 1827
224	<i>Tornatella puncto-striata</i> , Ad.	S	...	Perhaps <i>Acteon pusillus</i> . <i>G. Acteon</i> .

No. 2.	Name of Species.	N or Cape Cod	European, E.	Synonyms and Remarks
226	Polycera Lessonii, D'Orbigny ...	N	E	
228	Doris bilamellata, L.	N	E	
229	..... tenella, Agassiz ...	N	...	Perhaps <i>D. inconspicua</i> , which is European.
229	..... pallida, Ag. (1870) ...	N	E	<i>D. aspera</i> , Alder & Hancock, 1842.
230	.... diademata, Ag. (1870) ...	N	E	<i>D. tuberculata</i> , Cuvr. 1802
231	.... planulata, St. (1853) ...	N	E	<i>D. refunda</i> , A. & H., 1842
232	.... grisea, St.	N	...	"Very closely allied to <i>D. inconspicua</i> ."
233	Aneula sulphurea, St.	N	...	"Very like to <i>Aneula cristata</i> ," which is European
234	Dendronotus arborescens, Müll.	N	E	
236	Dota coronata, Gm.	N	E	
238	Æolis papillosa, L.	N	E	
240	..... salmonacea, De Kay (1843)	N	...	<i>Eolis bodoensis</i> , Moll., 1842
241	..... Bostoniensis, Couth.	N	...	"Approaching closely <i>E. coronata</i> of Forbes,"
242	..... rufibranchialis, Johnston ...	N	E	[which is European.]
243	.... pilata, Gould ...	N	...	
245	.... stellata, St.	N	...	
246	.... purpurea, St.	N	...	
246	.... picta, A. & H.	N	E	
247	.... diversa, Couth	N	...	
248	.... despecta, Johnston	N	E	
249	.... gymnota, De Kay	N	...	
250	Calliopaea (?) fuscata, Gould	N	...	
251	Embletonia fuscata, Gould	N	...	
252	.... remigata, Gould ...	N	...	
253	Hermæa cruciata, Alex. Ag.	S	...	
254	Alderia Harvardiensis, Ag.	N	...	
255	Elysia chlorotica, Ag.	N	...	
256	Placobranchus catus, Ag.	N	...	
258	Limapontia zonata, St.	N	...	
258	Chiton apiculatus, Say ...	S	...	
259	..... cinereus, L.	S	E	<i>C. marginatus</i> , not <i>C. cinereus</i> . A single specimen only; questionable
260	.... ruber, Lowe ...	N	E	
261	.... marmoratus, Fabr.	N	E	
263	.... albus, Mont.	N	E	<i>L.</i> , not Mont.
263	.... mendicarius, Migh. & Ad. (1842) ...	N	E	
264	Amicula Emersonii, Couth	N	...	<i>C. Hanleyi</i> , Bean, Thorpe, [1844.
266	Dentalium dentale, L.	N	...	<i>D. striolatum</i> , var.
266	Entalis striolata, St. (1851)	N	E	<i>Dentalium abyssorum</i> , Sars, 1858, var.
267	Tectura testudinalis, Müll	N	E	
269	.... alveus, Com.	N	...	<i>T. testudinalis</i> , var.
270	Lepeta caeca, Müll	N	E	
271	Crepidula fornicata, L.	N	E	
272	.... plana, Say ...	N	...	<i>C. fornicata</i> , var.
273	.... convexa, Say ...	N	...	<i>C. fornicata</i> , var.
274	.... glauca, Say	N	...	
275	Crucibulum striatum, Say	N	...	<i>G. Punctarella</i> .
276	Cemoria noachina, L.	N	E	Lam., not Desh. Specific name changed to <i>communis</i> , 1822.
277	Ianthina fragilis, Deshayes	N	E	

Page.	Name of Species.	N. or S. of Cape Cod.	European.	Synonyms and Remarks.
278	Adeorbis costulata, Möll. ...	N	E	<i>G. Mölleria.</i>
279	Margarita cinerea, Couth. ...	N	E	<i>G. Trochus.</i>
280	..... undulata, Sewerry (1838)	N	E	<i>Trochus Grænlæns,</i> <i>Ch., 1781.</i>
281	..... helicina, Fabr. ...	N	E	<i>G. Trochus.</i>
282	..... argentata, Gould (1841) ...	N	E	<i>Trochus glaucus</i> , Moll. 1842
283	..... obscura, Couth. ...	N	E	<i>G. Trochus.</i>
284	..... acuminate, Migh. & Ad. ...	N	...	<i>Trochus varicosus</i> , young.
285	..... varicosa, Migh. & Ad. (1842)	N	E	<i>M. eleg. antissima</i> , Bean, S. Wood, 1848. <i>G. Trochus</i>
286	Trochus occidentalis, Migh. & Ad.	N	E	
286	Valvata tricarinata, Say (1817)	N	E	<i>V. piscinalis</i> , Mull., 1774, [var.]
288	..... pupoidea, Gould ...	N	...	
289	Melanthro decisa, Say ...	N	...	
292	Amnicola pallida, Haldeman ...	N	...	<i>G. Hydrobia.</i>
293	..... limosa, Say ...	N	...	<i>G. Hydrobia.</i>
294	..... granum, Say ...	N	...	<i>G. Hydrobia.</i>
295	Pomatiopsis lapidaria, Say ...	S	...	
296	Skenea planorbis, Fabr. ...	N	E	
297	Rissoella? curnearia, St. ...	N	...	<i>G. Rissoa.</i>
297	..... sulcosa, Migh. ...	N	...	<i>G. Rissoa.</i> One specimen only.
298	Rissoa minuta, Tott. (1834) ...	N	E	<i>Hydrobia ventrosa</i> , Mont., 1803, var.
299	..... latior, Migh. & Ad. ...	N	...	
300	..... aculeus, Gould (1841) ...	N	E	<i>R. striata</i> , J. Adams, 1795.
300	..... multilineata, St. ...	N	...	<i>R. striata</i> , var.
301	..... Mighelsi, St. ...	N	...	
301	..... exarata, St. ...	N	...	
301	..... carinata, Migh. & Ad. ...	N	E	
302	Lacuna vincta, Mont. (1803) ...	N	E	<i>L. divaricata</i> , Fabr., 1780.
303	..... neritoidea, Gould (1840) ...	N	E	<i>L. pallidula</i> , Turt. 1827 var
304	Littorina rudis, Don. ...	N	E	Maton, instead of Don.
306	..... tenebrosa, Mont. ...	N	E	<i>L. rudis</i> , var.
308	..... litorea, L. ...	N	E	
309	..... palliata, Say (1822) ...	N	E	<i>L. obtusata</i> , L., 1766, var. <i>L. limata</i> , Low, 1846.
311	..... irrorata, Say ...	S	...	
311	Scalaria Nov.-angliae, Couth. ...	N	...	<i>S. multistriata</i> , var.
312	..... lineata, Say ...	S	...	
313	..... multistriata, Say ...	S	...	
314	..... Grænlæns, Ch. ...	N	E	
315	Cæcum pulchellum, St. ...	S	...	
316	Vermetus radicula, St. ...	S	...	
317	Turritella erosa, Couth (1839) ...	N	E	<i>T. polaris</i> , Möll., 1842.
318	..... reticulata, Migh. & Ad. (1842) ...	N	E	<i>T. lactea</i> , Möll., 1842.
319	..... acicula, St. ...	N	...	
320	Aporrhais occidentalis, Beck ...	N	...	
321	Bittium nigrum, Tott. ...	S	...	
322	..... Greenii, Ad. (1839) ...	N	E	<i>G. Cerithium.</i> <i>Cerithiopsis tubularis</i> , [Mont., 1803.]
323	Triforis nigrocinctus, Ad. ...	S	...	
325	Odostomia producta, Ad. ...	S	...	
325	..... fusca, Ad. ...	S	...	
327	..... dealbata, St. ...	N	...	
327	..... modesta, St. ...	N	...	
327	..... bisuturalis, Say ...	N	...	
328	..... trifida, Tott. ...	S	...	<i>S. impressa</i> , var.
329	..... seminuda, Ad. ...	N	...	

Page	Name of Species.	N. or S. of Cape Cod.	European.	Synonyms and Remarks.
330	Odostomia impressa, <i>Say</i> (1822)	S	...	<i>O. ovalata</i> , Caillaud, 1865.
331	Turbonilla interrupta, <i>Tott</i> (1834)	N	E	<i>Melania rufa</i> , Ph., 1836, var. <i>G. Odostomia</i> .
331	..... nivea, <i>Sz.</i>	N	...	Perhaps <i>Turbo lacteus</i> , L.
332	Eulima oleacea, <i>Kurtz & St.</i> ...	S	...	<i>G. Odostomia</i> .
333	Menestho albula, <i>Möll.</i>	N	...	Apparently not this species, which is American.
334	Velutina haliotoidea, <i>Fabr.</i> (1780)	N	E	<i>V. larvigata</i> , Pennant, 1777
335	..... zonata, <i>Gould</i> , (1841) ...	N	E	<i>V. undata</i> , Brown, 1827.
337	Lamellaria perspicua, <i>L.</i>	N	E	
338	Lunatia heros, <i>Say</i> (1822)	N	...	<i>Natica catenoides</i> , S. Wood 1848.
349	..... tricristata, <i>Say</i>	N	...	<i>Natica heros</i> , young.
341	..... Greenlandica, <i>Möll.</i>	N	...	Beck, <i>sive</i> Möll. <i>G. Natica</i>
342	Natica clausa, <i>Hup. & Nov.</i> (1829)	N	E	<i>N. affinis</i> , Gm., 1790.
344	..... pusilla, <i>Say</i> ...	S	...	
344	Mamma? immaculata, <i>Blot</i>	N	...	<i>G. Natica</i> .
345	Neverita duplicata, <i>Say</i>	N	...	<i>G. Natica</i> .
347	Buibus flavus, <i>Gould</i> , (1840) ...	N	E	<i>Natica Smithii</i> , Brown 1839 = <i>N. aperta</i> , Lov., 1846
348	Amauroopsis helicooides, <i>Johnston</i> (1835)	N	...	
349	Pleurotoma bicarinata, <i>Couth</i> ...	N	E	<i>Natica Islandica</i> , Gm. 1790
350	..... plicata, <i>Ad.</i> (1842)	N	...	
351	Bela turricula, <i>Mont.</i> ...	N	E	<i>P. declivis</i> , Lov., 1846.
352	..... harpularia, <i>Couth</i> ...	N	E	<i>G. Pleurotoma</i> .
353	..... violacea, <i>Migh. & Ad.</i> (1842)	N	E	<i>G. Pleurotoma</i> .
354	..... decussata, <i>Couth</i> (1841) ...	N	E	<i>Defranceia Bockii</i> , Möll., 1842. <i>G. Pleurotoma</i> .
355	..... cancellata, <i>Migh. & Ad.</i> (1842) ...	N	E	<i>Pleurotoma Trezelyana</i> , Turt., 1834.
355	..... Pleurotomaria, <i>Couth</i> (1839)	N	E	<i>Defranceia Pingelii</i> , Möll., 1842. <i>G. Pleurotoma</i>
356	Columbellula avara, <i>Say</i> ...	S	...	<i>Buccinum pyramidale</i> , Ström, 179—. <i>G. Pleuro-</i> <i>toma</i> .
357	..... rosacea, <i>Gould</i> , (1840) ...	N	E	<i>C. Holbollii</i> , Beck, Möll., [1842].
358	..... dissimilis, <i>Sz.</i> ...	N	...	
359	..... lunata, <i>Say</i> ...	S	...	
360	Purpura lapillus	N	E	
362	Nassa obsoleta, <i>Say</i> ...	N	...	Subgenus <i>Desmonlea</i> .
364	..... trivittata, <i>Say</i> (1822)	N	...	<i>N. propinqua</i> , J. Sow., 1824
365	..... vibex, <i>Say</i> ...	S	...	
366	Buccinum undatum, <i>L.</i>	N	E	
368	..... ciliatum, <i>Fabr.</i> ...	N	E	Not that species, but <i>B.</i> <i>undulatum</i> , Möll.
369	..... Donovani, <i>Gray</i> (1839) ...	N	E	<i>B. glaciale</i> , L., 1766.
370	..... cinereum, <i>Say</i> ...	N	...	<i>G. Urosalpinx</i> , allied to <i>Purpura</i> .
371	Fusus Islandicus, <i>Gm.</i> ...	N	...	Not that species, but <i>F.</i> <i>curvus</i> , Jeffr.
372	..... pygmæus, <i>Sz.</i> ...	N	...	Not <i>Buccinum Sabinii</i> or <i>Fusus Sabini</i> , Gray.
373	..... ventricosus, <i>Gray</i>	N	...	
374	..... tornatus, <i>Gould</i> (1840) ...	N	E	<i>F. despectus</i> , L., 1766.
375	..... decemcostatus, <i>Say</i> ...	N	...	
377	Trophion clathratus, <i>L.</i>	N	E	Not that species, but <i>T.</i> <i>truncatus</i> , Str.
378	..... scalariformis, <i>Gould</i> (1840)	N	E	<i>T. clathratus</i> , L., 1766.

Page.	Name of Species.	N. or S. Cape Cod.	European.	Synonyms and Remarks.
379	Trophon muricatus, Mont.	N	E	Doubtful as American.
380	Busycon canaliculatum, L.	S		
383	..... carica, Gm.	S		
385	Fasciolaria ligata, Migh. & Ad.	N		
386	Ranella caudata, Say	S		
387	Cerithiopsis Emersonii, Ad.	S	..	G. Cerithium, not Cerithiopsis.
389	.... terebralis, Ad. (1841)	S	E	C. trilineata, Ph., 1836.
390	Trichotropis borealis, Sow.	N	E	Broderip and Sowerby's species.
391	Admete viridula, Fabr.	N	E	
394	Vitrina limpida, Gould, (1850)	N	E	V. pellucida, Mull., 1744
395	Hyalina cellaria, Müll.	N	E	G. Zonites.
396	..... arborea, Say	N	..	Closely allied to Z. excavatus, but umbilicus much less open.
397	.... electrina, Gould (1841)	N	E	Zonites radiatulus, Alder, [1830, var. alba.
398	.... indentata, Say	N		
399	.... minuscula, Binney	S		
400	.... Binneyana, Morse	N		
401	.... milium, Morse	N		
401	.... ferrea, Morse	N		
402	.... chersina, Say (1821)	N	E	Zonites fulvus, Mull., 1774
403	.... minutissima, Lea (1841)	N	E	Helix pygmaea, Drap., 1805
404	.... multidentata, Binney	N		
404	.... lineata, Say	N		
406	Macrocyclus concava, Say	N		
407	Limax maximus, L.	NN	E	
408	.... agrestis, L.	NN	E	
409	.... campestris, Binney (1841)	N	E	L. laevis, Mull., 1774.
410	.... flavus, L.	N	E	
412	Helix alternata, Say	N		
413	.... striatella, Anthony	N		
415	.... asteriscus, Morse	N		
415	.... labyrinthica, Say	N		
417	.... hirsuta, Say	N		
418	.... monodon, Rackett	N		
420	.... palliata, Say	N		
422	.... tridentata, Say	N		
423	.... albolabris, Say	N		
424	.... dentifera, Binn.	N		
425	.... thyrodes, Say	N		
426	.... Sayii, Binn.	N		
427	.... ? harpa, Say	N	E	Sweden.
428	.... pulchella, Müll.	N	E	
429	.... hortensis, Müll. (1774)	N	E	H. nemoralis, L., 1766 var.
431	Cionella subcylindrica, L.	N	E	Perhaps that species, but described as inhabiting fresh water. Cochlicopa lubrica, Mull.
433	Pupa muscorum, L. ....	..	N	Linne's species is unascertainable. P. marginata, Drap.
433	.... Hippia, Moll. ....	..	N	
434	.... pentodon, Say ....	..	N	
435	.... decora, Gould ....	..	N	
436	.... fallax, Say ....	..	S	
437	.... armifera, Say ....	..	N	
438	.... contracta, Say ....	..	N	
439	.... rupicola, Say ....	..	N	

Page.	Name of Species.	N. or S. of Cape Cod.	European.	Synonyms and Remarks.
439	Pupa corticaria, <i>Say</i> ...	N	E	<i>V. alpestris</i> , Ald., 1830.
440	Vertigo Gouldii, <i>Binn.</i> (1843)	N	E	<i>V. alpestris</i> , Ald., 1830.
441	.... milium, <i>Gould</i> ...	N	E	<i>I. pygmaea</i> , Drap., 1801.
442	.... <i>Bollesiana</i> , <i>Morse</i> (1865)	N	E	<i>V. antivertigo</i> , Drap., 1801.
442	.... ovata, <i>Say</i> (1822) ...	N	E	<i>V. Moulinsiana</i> , Dy., 1843.
443	.... ventricosa, <i>Morse</i> (1865)	N	E	<i>V. edentula</i> , Drap., 1805.
444	.... simplex, <i>Gould</i> (1840) ..	N	E	<i>S. elegans</i> , Risso, 1820.
445	Succinea ovalis, <i>Gould</i> (1841)	N	E	Allied to <i>S. putris</i> , var. <i>ochracea</i>
446	.... avara, <i>Say</i> ...	N	E	<i>S. putris</i> , L., 1766.
447	.... obliqua, <i>Say</i> (1824) ...	N	E	<i>S. putris</i> , var.
448	Totteniana, <i>Lea</i> ...	N	E	Perhaps that species. <i>A.</i> <i>hortensis</i> , Ferussac 1819.
451	Arion fucus, <i>Mill</i> (1774)	N	E	<i>Zonites</i> is masculine; see [De Montfort.
453	Zonites inornata, <i>Say</i> ...	N	E	<i>G. Melampus</i> .
454	.... suppressa, <i>Say</i> ...	N	E	<i>C. minimum</i> , Mull., 1774.
454	.... fuliginosa, <i>Griffith</i> ...	N	E	Specific name preoccupied. <i>M. cornutus</i> , Desh.
457	Tebennophorus dorsalis, <i>Binn.</i>	N	E	<i>L. palustris</i> , Mull., 1774.
459	Alexia myosotis, <i>Drap.</i> ...	N	E	<i>L. catascopium</i> , var.
460	Carydium exiguum, <i>Say</i> (1822)	N	E	<i>L. truncatula</i> , var.
467	Melampus bidentatus, <i>Say</i> ...	N	E	Allied to <i>L. truncatula</i> .
471	Limnaea columella, <i>Say</i> (1817)	N	E	<i>L. truncatula</i> , var. <i>elegans</i> .
473	.... decollata, <i>Migh.</i> ...	N	E	<i>L. truncatula</i> , Mull., 1774.
474	.... ampla, <i>Migh.</i> ...	N	E	<i>L. truncatula</i> , var.
475	.... elodes, <i>Say</i> (1821) ...	N	E	<i>L. palustris</i> , Mull., 1774.
478	.... desidiosa, <i>Say</i> ...	N	E	<i>L. truncatula</i> , var.
479	.... catascopium, <i>Say</i> ...	S	E	
480	.... umbilicata, <i>Ad.</i> ...	N	E	More nearly allied to <i>P.</i> <i>rivalis</i> , Mat. & Rack. than [to <i>P. fontinalis</i> .
481	.... pallida, <i>Ad.</i> ...	N	E	<i>P. trivolvis</i> , var.
482	.... humilis, <i>Say</i> (1822) ...	N	E	<i>P. trivolvis</i> , Mull., 1774
483	Physa heterostropha, <i>Say</i> ...	N	E	
485	... ancillaria, <i>Say</i> ...	S	E	<i>P. albus</i> , Mull., 1774.
486	Bulinus elongatus, <i>Say</i> (1821)	N	E	<i>P. aspis</i> , var. <i>Dragonwaldi</i> .
488	Planorbis trivolvis, <i>Say</i> ...	N	E	Allied to <i>P. nitidus</i> .
490	.... lenticus, <i>Say</i> ...	N	E	<i>P. glaber</i> , Jesfr., 1828.
491	.... bicarinatus, <i>Say</i> ...	N	E	Perhaps introduced into
492	.... campanulatus, <i>Say</i> ...	N	E	England and naturalized
493	.... hirsutus, <i>Gould</i> (1840) ...	N	E	<i>G. Planorbis</i> .
494	.... dilatatus, <i>Say</i> ...	N	E	Allied to <i>A. lacustris</i> .
495	.... exacutus, <i>Say</i> ...	N	E	
497	.... parvus, <i>Say</i> (1817-19) ...	N	E	<i>G. Cavolina</i> .
498	.... dilatatus, <i>Gould</i> ...	N	E	<i>G. Spirialis</i> .
499	Segmentina armigera, <i>Say</i> ...	N	E	<i>G. Spirialis</i> .
501	Ancylus parallelus, <i>Hald.</i> ...	N	E	<i>G. Spirialis</i> .
502	.... fuscus, <i>Ad.</i> ...	N	E	<i>C. papillatum</i> , Pall. 1766
504	Dianeria trispinosa, <i>Lesueur</i> ...	N	E	
504	Psyche globulosa, <i>Rang</i> ...	N	E	
505	Heterofusus balea, <i>Moll</i> ...	N	E	
505	.... retroversus, <i>Fleming</i> ...	N	E	
507	Clion limnaria, <i>Philipps</i> (1773)	N	E	
509	Loligopsis pavo, <i>Les.</i> ..	N	E	
510	Omnastrephes sagittatus, <i>Fér</i> & <i>D'Orb</i> ...	N	E	Lamarck's species. <i>G. Om-</i> <i>astrephes</i> .
513	Loligo punctata, <i>De Kay</i> ...	S	E	[<i>matostrephes</i> .
514	.... Pealei, <i>Les.</i> ...	N	E	
516	Spirula fragilis, <i>Sz.</i> (1860)	S	E	<i>S. australis</i> , Brug. 1789-92

ON THE DIFFICULTIES OF RECOGNISING "NAMED VARIETIES" ACCORDING TO THE ACCEPTED AUTHORITIES.

By T. ROGERS.

A knowledge of the species of Land and Freshwater Shells which are indigenous or naturalized to the British Isles is readily acquired by the student of Conchology, and they are readily arranged in the cabinets of collectors under their proper names and typical characters, a few species excepted.

The most difficult and most unsatisfactory part of the subject, however, is that which relates to a proper knowledge of what are known by Conchological authorities as "named varieties." This is especially the case with such varieties as depend upon form or shape for their chief varietal distinction.

In studying the shells alone, as distinct from any variation which may exist in the animals, the aberrant forms may be divided into three or four divisions. First, and perhaps the least important, are those variations which arise from colour or want of colour. This would include the white varieties. The next would be those varieties in which the texture, structure, thickness, and maximum and minimum size of the shell are noticed. This section would contain the crystalline, iridescent, incrassate, and major and minor varieties.

The next division, and that which I venture to think the most important, is the one in which we recognise difference in form or shape, this being the chief character under which specific differences are arranged under generic characters, notwithstanding a great many anomalies, such as elevated and depressed spires, swollen and compressed whorls of the *Helices*, &c., abnormal contortions of the *Planorbis* or ventricose shells of the bivalves. It is in this division of variation in which Conchological students find the most difficulty, owing chiefly to the fact of not having some standard of variation which would be understood by such terms used, as *sub-maritima*, *sub-globosa*, *gigaxii*, *conoidea*, *oblonga*, *sub-scalaris*, &c., &c.

Most students, I think, find that the brief technical language given in books is inadequate to convey to the mind that which is intended. If it should be within the means of the Editors of the Conchological Journal to give from time to time outline sketches of abnormal forms under recognised varietal names—given by such eminent authorities as Jeffreys, for instance—it would be very valuable and interesting, especially to the student subscribers of this interesting Journal.

In the foregoing remarks I have but alluded casually to the variation of the animal which inhabits the shell, which doubtless varies more or less in conformity to the variations in the shell, either in some particular organ which regulates colour or texture and general form combined; but as these particulars are not mentioned by authors generally, except such variation as refers to colour in the animal, we may infer that difference in the shell is chiefly recognised in the naming of varieties of such that are shell-bearing. The fact that when any difference in form is made apparent in a particular organ or combination of organs in the animal which inhabits the shell, it is then placed on debatable ground as to its rank as species or variety; this shows how important variation in form is to be considered in relation to other varietal differences.

I wish to repeat again that if it was well understood by Conchological students what a "named variety" was according to some recognised standard, what additional value and importance it would give to the combined observances of Conchologists and collectors in noting that such a variety of some particular species had been found on the sea coast or inland situation, on the mountain or in the valley, in the woods or in the open field, on rocks or in the marsh, in the water fresh or brackish; in the running stream or standing pool; or water charged with inorganic compounds, as iron or lime; or organic compounds, as vegetable or dead animal matter; or geologically, on chalk, limestone, sandstone, slate or coal, &c.

Observations made under these circumstances and noted from time in this Journal, I venture to think would help to elucidate the causes of variation and the geographical distribution of species.

P.S.—Since writing the preceding remarks in reference to the desirability of student subscribers to the Journal of Conchology exactly understanding what amount of difference from the typical form might be considered sufficient to mark a named variety, it has occurred to me that several small boxes or set of boxes, suitable for posting, might be kept at the office of the Journal, which would contain single specimens of each of the several varieties of single species or group of species, which had been identified as such—say by Mr. Jeffreys—and that these boxes should be lent for a stated period—say a week—to such of your subscribers as might desire to see the same, and would be willing to send—say twelve samples; these to be returned on the return of the box, after deducting postage, or kept as security for other boxes which he might desire to see, or kept in hand on subscription account. Boxes also might be prepared containing type shells of critical species, which, I think, are not always found correctly named even in good collections.

A LIST OF LAND AND FRESHWATER SHELLS
FOUND IN THE NEIGHBORHOOD OF ACK-
WORTH, YORKSHIRE.

BY CHARLES ASHFORD.

Ackworth is eight miles from Wakefield and three from Pontefract. The circle in which the following shells were collected is therefore contiguous to the Wakefield district, and as it lies partly upon the magnesian limestone and partly upon sandstone, a number of shells occur in it which appear to be absent from the Wakefield district, as a comparison with the list published in the first number of this Journal will show.

Sphaerium corneum L.—Common throughout the district.

Sphaerium lacustre Mull.—Sparingly in a stagnant pond near the Wakefield road.

Pisidium amnicum Mull.—Common in running streams.

Pisidium fontinale Drap.—Common in ponds.

Pisidium fontinale var. *Henslowana*.—Common in an artificial stream at Ackworth. This variety has the usual umbonal appendage but slightly developed, and the late Mr. Jenyns considered it intermediate between the well-marked variety and the normal form.

Pisidium fontinale v. *cinerea*.—Common in several ponds.

Pisidium fontinale v. *pulchella*.—Common in Hemsworth reservoir and other places. This is the variety δ of Jenyns.

Pisidium pusillum Gmelin.—Pond near Hasel Green and elsewhere.

Pisidium nitidum J. n.—Rare. Large series of shells of this difficult genus were submitted to Messrs. Alder and Jenyns, who kindly determined the species as here recorded.

Unio tumidus Phil.—Common in the River Went at Went Vale.

Unio tumidus var. *radiata*.—Not common in the Went.

Unio pictorum L.—River Went, less common than *tumidus*.

Anodonta cygnea L.—Plentiful in Hemsworth reservoir and the lake at Nostell.

Dreissena polymorpha Pult.—Abundant in Winterset reservoir.

Bythinia tentaculata L.—Common throughout.

Valvata piscinalis Mull.—Common in the mill pond, Ackworth, and in Winterset reservoir.

Valvata cristata Mull.—A few specimens found in the Went, attached to the tenement of a caddis worm.

Planorbis nitidus Mull.—Once common among duckweed in a roadside pond, but scarce a year or two afterwards.

Planorbis nautilus L.—Extremely abundant in various ponds.

Planorbis nautilus v. cristata.—Common with the type.

Planorbis albus Mull..—Common throughout. Fine in Hemsworth reservoir.

Planorbis glaber Jeffr..—Abundant in a fishpond in Ackworth park, and there only.

Planorbis spirorbis Mull..—Common throughout.

Planorbis vortex L..—Common throughout.

Planorbis carinatus Mull..—Mill pond, Ackworth; not common.

Planorbis complanatus L..—Common in several parts.

Physa hypnorum L..—Moderately common in ditches, but not everywhere.

Physa fontinalis L..—Generally distributed.

Limnæa peregra Mull..—Common throughout.

Limnæa auricularia L..—Common in Winterset and Hemsworth reservoirs.

Limnæa palustris Mull..—In small field pools nr. Hasel Green.

Limnæa truncatula Mull..—Common throughout.

Limnæa glabra Mull..—Very local. Abundant in one pond near Hasel Green.

Ancylus fluviatilis Mull..—River Went and smaller streams.

Ancylus lacustris L..—Common on the stems of the water flag in one or two ponds.

Arion ater L..—Common throughout.

Arion hortensis Fer..—Not uncommon in various parts.

Limax marginatus Mull..—Several found on one occasion upon a stone wall at Ackworth after rain.

Limax agrestis L..—Too common everywhere.

Limax maximus L..—Common in most parts.

Succinea putris L..—Tolerably common, but small.

Succinea elegans Rissö.—In profusion on the banks of Hemsworth reservoir.

Vitrina pellucida Mull..—Common throughout.

Zonites cellarius Mull..—Common throughout.

Zonites alliarius Miller.—Occasional throughout.

Zonites glaber Studer.—Not yet found within the district.

Nearest recorded locality is a wood near Conisbro' Castle, Doncaster.

Zonites nitidulus Drap..—Common throughout.

Zonites nitidulus v. nitens.—More common than type.

Zonites purus Alder.—Common throughout.

Zonites radiatulus.—Found sparingly with *Z. purus*.

Zonites nitidus Mull..—Abundant by Hemsworth reservoir.

Zonites excavatus Bean.—In a wood near Winterset reservoir; rare.

Zonites crystallinus Mull..—Common throughout.

Zonites fulvus Mull..—Found occasionally in woods.

Helix aculeata Mull..—Common in Went Vale; less common elsewhere.

Helix aspersa Mull..—Common throughout.

Helix nemoralis L.—Common throughout.

Helix nemoralis var. *hortensis*.—Not so common.

Helix nemoralis var. *hybrida*.—Rare in the district.

Helix cantiana Mont.—Road to Pontefract; common but local.

Helix rufescens Penn.—Common throughout.

Helix rufescens var. *albida*.—Rare.

Helix concinna Jeff.—(?) Common by repute. I have not found satisfactory specimens myself.

Helix hispida L.—Common throughout.

Helix hispida var. *albida*.—Rare.

Helix sericea Mull.—Rare.

Helix fusca Mont.—Not yet found in the district, but occurring in woods near Doncaster.

Helix virgata D.C.—Abundant on the limestone part of the district.

Helix caperata Mont.—Not uncommon on the limestone.

Helix ericetorum Mull.—On the limestone, Went Vale.

Helix rotundata Mull.—Common throughout.

Helix pygmæa Drap.—Common in Went Vale; occasionally elsewhere.

Helix pulchella Mull.—Common in Went Vale; found occasionally elsewhere.

Helix pulchella var. *costata*.—Common in Went Vale.

Helix lapicida L.—On the limestone rocks of Went Vale only.

Bulimus obscurus Mull.—Found occasionally throughout.

Pupa umbilicata Drap.—Common throughout.

Pupa marginata Drap.—In the limestone part of the district; not common.

Vertigo antivertigo Drap.—Common on banks of Hemsworth reservoir.

Vertigo pygmæa Drap.—Common in Went Vale.

Vertigo substriata J. J.—Went Vale; local and rare.

Vertigo pusilla Mull.—Very common in Went Vale.

Vertigo edentula Drap.—Rather common in Went Vale.

Vertigo minutissima Hartm.—Went Vale; rare. The last five species were found associated.

Clausilia rugosa Drap.—Common throughout.

Cochlicopa lubrica Mull.—Common in most parts.

Achatina acicula Mull.—Empty shells found in Went Vale.

Carychium minimum Mull.—Common in most parts.

GROVE HOUSE, TOTTENHAM.

Helix rotundata v. *alba* (M.-T.) at Conisbro' Castle.—On the 2nd of June, 1873, I found at Conisbro' Castle a specimen of this rare but widely-distributed variety.—G. TAYLOR, Wakefield.

Occurrence of *Zonites glaber* (*Stud.*) nr. Leeds.—During September, last year, whilst shell collecting in the neighbourhood of Collingham, accompanied by my friends Messrs. Taylor & Whitwham, we found large specimens of this fine *Zonites*.—W. NILSON, Leeds.

A CATALOGUE OF THE LAND AND FRESHWATER MOLLUSCA OF NORTHUMBERLAND AND DURHAM.

By W. D. SUTTON.

In compiling this catalogue, which comprises to a considerable extent the records of locality, the relative abundance or scarcity, and other remarks respecting the fauna of this district, I have been very materially assisted by reference to a "Catalogue of the Land and Freshwater Mollusca of the Vicinity of Newcastle," by the late Joshua Alder, Esq., which was published in the "Natural History Society's Transactions" in 1830, to which a supplement was added in 1838. More recently the contributions of Mr. William King, late curator of the Newcastle-on-Tyne Museum, and of Mr. Richard Howse to the "Annals of Natural History," have illustrated several of our rarer species. Since, however, these contributions were written, now upwards of a quarter of a century has elapsed, and great transformations have taken place in the district, and localities which then existed and were favourite resorts for Conchologists, botanists, and others, have had their rural character entirely changed, and from various causes either have entirely disappeared or have given place to large manufactories, collieries, or similar other industries, such as railway requirements; or as in the case of the extensive series of small lakes, situated at Prestwick Carr, some seven or eight miles distant from Newcastle, and which comprised several hundred acres of swampy, boggy land, these were all doomed to disappear about fifteen years ago by the Commissioners for Reclaiming Waste Lands. Consequently about the only locality in the district in which were found *Anodonta cygnea* and its varieties, likewise *Limnaea stagnalis*, *L. palustris*, *Planorbis cornutus*, and several other species, can no longer be regarded as available, the district now producing good crops of wheat, oats, and turnips, where formerly peat moss and boggy swamps prevailed. In the inland portion of the two counties, and on the east coast, the surface of the country is a good deal diversified, but upon the whole it is rather too hilly, particularly in the western parts, to be very productive of the land and freshwater mollusca, which are generally thinly scattered in upland and exposed situations. The valleys, however, produce a very considerable number of the land species. These abound most on a limestone formation, and a few species are nearly confined to that description of rock, such, for instance, as *Clavilina dubia* and *C. rugosa*. The limestone appears to predominate more in the north-east corner of the county of Durham, say between Shields and Hartlepool, having Sunderland for its centre, and some of the romantic valleys which lie between the two extremes, such as Castle Eden Dene, Hawthorn Dene, Hetton Dean, and Ryhope Dean, are very favourite resorts for Conchologists and botanists, and abound

with many of the rarer species. Owing to the small extent of marshes and ditches, as also to the absence of canals or sluggish rivers, in addition to the lower temperature, the freshwater species are much less abundant than in the south of England. Nearly all the rivers, with but slight exceptions, are rapid in their course, over either stony or rocky beds, partaking more of the character of the Scotch rivers. Such may be said to be the character of the river Reed, in the north-west of Northumberland, where very fine specimens of the *Unio Margaritifera* are to be met with above Otterburn, in the earlier and more precipitous part of its course.

Sphaerium corneum L.—In ponds and ditches; common throughout the country.

Sphaerium lacustre Mull.—In ponds; by no means common throughout the district. It occurs in a pond at Kenton, near Newcastle, likewise a pond on the Town Moor, the Keel Quarry pond, near Benton, and a pond near Marsden, county of Durham. This may possibly be the *Tellina lacustris* of Mull., but as Continental authors consider it distinct, Draparnaud's name has been adopted.

Pisidium amnicum Mull.—Rather rare; in slow streams. Occurs near Stockton-on-Tees and the Mill Race in Jesmond Dean.

Pisidium fontinale var. *pulchella* Jenyns.—In ponds and ditches; tolerably plentiful throughout the district. Occurs at Keel Quarry pond, near Benton.

Pisidium fontinale var. *cinerea* Alder.—Plentiful in a pond near Castle Eden Dean, near Hartlepool; also at Whitley reservoir, near Cullercoats. A more ventricose variety is found in ditches near to Brandling village.

Pisidium pusillum Gmel.—In ponds and ditches; frequent throughout the district.

Pisidium pusillum var. *obtusalis* Pfr.—Occurs in some ponds near Darlington.

Pisidium nitidum Jenyns.—This likewise occurs in some ponds near to Darlington.

Unio margaritifer L.—In mountain streams and rivers in the early and more precipitous part of their course. Very fine specimens occur in the river Reed, above Otterburn, in Northumberland.

Anodonta cygnea L.—In ponds, only occasionally. Occurs in the Black Pool, near Dinnington, Northumberland.

Neritina fluviatilis L.—This has been frequently met with on our coast, but as it is a common ballast shell, must be attributed to this source. Found also in the neighbourhood of Stockton-on-Tees, in the county of Durham. Rather doubtful in a live state.

Paludina vivipara L.—Though dead, specimens of these occur on our coasts. There is little doubt but that they have been brought in ballast from the south of England, and to that source are attributed.

Bythinia tentaculata L.—In ponds and ditches; not common near Newcastle and its district, but abundant near Stockton-on-Tees and that locality.

Valvata piscinalis Mull.—Rather rare, in ponds and slow streams. The Mill Race, Jesmond Dean. More plentiful in streams near Stockton-on-Tees.

Valvata cristata Mull.—Rare, in ditches near Ponteland, in Northumberland.

Planorbis nitidus Mull.—Rather rare; occurs in ponds at Redheugh and Benwell, near Newcastle, also near Middleton One Row, and Stockton-on-Tees, county of Durham.

Planorbis nautilus L.—In ponds in the neighbourhood of Newcastle frequently, and generally in abundance where it occurs. In a pond near Whitburn, in the county of Durham.

Planorbis nautilus var. cristata Drap.—Occurs with the type, but only sparingly.

Planorbis albus Mull.—Not common, but is to be met with occasionally in ponds and slow streams throughout the district.

Planorbis glaber Jeff.—Not common; is found in a pond near Benwell, at Ryton Haughs, and in a pond near the sea banks, near Whitburn, county of Durham, and also more plentifully, and fine specimens, on the Haughs of the River Coquet, near Rothbury, Northumberland.

Planorbis spirorbis Mull.—Frequently throughout the district. Occurs in a pond near Marsden, county of Durham.

Planorbis carinatus Mull.—Rare; is found in the neighbourhood of Stockton-on-Tees, county of Durham.

Planorbis complanatus L.—Moderately plentiful throughout the district. Occurs at Ryton Haughs and near Stockton-on-Tees, county of Durham, and at Rothbury, in Northumberland.

Planorbis corneus L.—Rare; is to be met with in the vicinity of Darlington.

Planorbis contortus L.—Not common. Occurs at Ryton Haughs, and near Stockton, county of Durham, and at Gosforth Lake, Rothbury, and near Wooler, in Northumberland.

Physa hypnorum L.—In ditches and ponds occasionally, but like *P. fontinalis*, generally plentifully when it does occur. Found in ponds near Kenton, Northumberland.

Physa fontinalis L.—In ponds and ditches; generally tolerably plentiful when it does occur. Is found at Ryton Haughs, Marsden, and near Stockton-on-Tees, in Durham, and at Gosforth Lake and Rothbury, on the haughs of the river Coquet.

Limnaea peregra Mull.—Common throughout the district, in ponds, ditches, and slow streams. The numerous varieties of this common species, in size, form, and consistency, are very perplexing to the Conchologist. Specimens found at Redheugh and on Holy Island have rather a strong shell and the spire much

produced, whilst some from the locality of Darlington possess the opposite extreme, and have a thin, delicate shell, and scarcely any spire. The latter comes very near to the form got by Mr. Thompson in Lough Neagh, Ireland, which is the *Glynnaria lacustris* of Leach.

Limnæa auricularia L.—Rather rare in the district; is to be met with at Gosforth Lake, in Northumberland, and in ponds near Darlington, county of Durham.

Limnæa palustris Mull.—Not common. Those found in marshes and still water in the district grow to a large size, but at the margins of rivers they are much stunted in growth, and have the aspect of a distinct species. On the shores of the Tyne, where they are more abundant, they are not larger than the common-sized *L. truncatula*, and might be taken for that species but for the less ventricose whorls, and that the latter species is also found in the same situations in an equally dwarfed condition.

Limnæa truncatula Mull.—Common in ponds and ditches throughout the district. Occurs in a pond near Kenton, and at Whitley reservoir, near Cullercoats, where the specimens are good and well defined.

Limnæa glabra Mull.—In ponds and ditches; not uncommon near Newcastle.

Ancylus fluviatilis Mull.—Of frequent occurrence throughout the district. Is met with in the rivulet in Scotswood Dean, stream near Brockley Whins, the river Coquet at Rothbury, and sundry other places.

Ancylus lacustris L.—Rather rare, on aquatic plants in ponds and ditches. Occurs in ponds near Benwell and Crag Lake, Northumberland; at near Middleton One Row, in the county of Durham.

Arion ater L. (common black slug).—In fields, woods, and hedges very common. Féruccac considers the black head and tentacles, and the transverse black lines round the margin of the foot, to be the only permanent distinctive characters in this very variable species. The varieties occurring in this neighbourhood are the following:—

1. Entirely black.
2. Black, with the sides of the foot yellow or orange.
3. Blackish above, with a black band on each side of the body, and the sides yellowish white.
4. Yellowish or greenish white, with black tentacles. The young are always much paler than the adults, and are sometimes of a transparent white. The Rufous variety is not met with in this district.

Arion flavus Flr.—Occasionally found on the moors near Haltwhistle in Northumberland. M. Bouchard-Chantereaux considers this species distinct from *A. ater*, and it has not the characters of the latter pointed out by Féruccac. It is too difficult a genus, however, to give a decided opinion upon.

Arion hortensis Fér.—In gardens, &c., common. A variety, or possibly a species, nearly allied to this is found in woods. It is about twice the size of the garden slug, and its colour invariably yellowish fawn, inclined to amber, with a brown band on each side. The two kinds are not found mixed, the one inhabiting the woods and the other cultivated grounds.

Limax marginatus Mull.—Occasionally at Benwell, near Newcastle.

Limax flavus L.—In cellars, &c.; not very common.

Limax agrestis L.—In fields and gardens; very common throughout the district.

Limax brunneus Drap.—In damp woods, frequent.

Limax tenellus Mull.—Occasionally occurs in a wood at Allansford, county of Durham. The specimen referred to was of a pale, dull yellow colour, very transparent and lubricous, with an obscure band on each side of the shield and back; the posterior part of the shield rounded; the tentacles black, length rather more than an inch; the mucus orange-coloured. In all these particulars it agrees with the description of *Limax tenellus* given by Nillson in his excellent little work, called "Historia Molluscorum Sueciae." Nillson's description is as follows:—"Animal parvum, vix. 4] unc. longum. Clypeus lineis subtilibus concentrica striatus, apertum lateribus posticis. Collum supra linea longitudinali elevata, lateribus subreticulatis. Dorsum postice compressum. Color clypei et dorsi postici luteus: dorso supra luteovirescente levissime cinerascente, subtus albo. Tentacula, caput, et linea colli utrinque, humida rarius."

Limax arborum Rough. Chant.—Occurs occasionally, and is to be met with in woods at Wolsingham and Shotley Bridge, in the county of Durham.

Limax maximus L.—In woods and fields; common throughout the district.

Succinea putris L.—Common on aquatic plants in marshy places, and at the borders of rivulets.

Succinea elegans Röss.—Of frequent occurrence; rather local. To be met with in the neighbourhood of Wark, North Tyne.

Vitrina pellucida Mull.—Common amongst decayed leaves and under stones in woods; more plentiful on the sea banks. Very abundant near St. Mary's Island, near Hartley, where, in some states of the weather, it is difficult to walk without crushing numbers of them.

Zonites cellarius Mull.—Common throughout the district; found generally in yards and cellars and under stones.

Zonites allarius Mull.—Common throughout the district, in woods or amongst moss.

Zonites nitidulus Drap.—Common throughout the district.

Zonites purus Alér.—Occurs occasionally in woods in the district, at Rothbury and Gibside Woods.

Zonites radiatus *Alder*.—In wet moss; not very plentiful. The variety occur in Gibside Woods, Durham.

Zonites nitidus *Mull.*—Occurs occasionally; not common.

Zonites excavatus *Bean*.—Rather rare. Occurs at Stella Dean, also in Gibside Woods, where there is a white variety occasionally found, but sparingly.

Zonites crystallinus *Mull.*—Common throughout district.

Zonites fulvus *Mull.*—Occurs occasionally, but sparingly.

The var. is found in a marshy spot in Heaton Dean, nr. Newcastle.

Helix lamellata *Jeff.*—Rather rare. It is met with occasionally in Gibside Woods, Durham, Walbottle Dean, Northumberland, and Tanfield Woods, Durham, but sparingly.

Helix aculeata *Mull.*—Rather rare throughout the district. Occurs at Ryhope Dean and Castle Eden Dean, Durham.

Helix aspersa *Mull.*—In gardens and on hedge sides, common. Very abundant on the sea banks on a limestone soil.

Helix nemoralis *L.*—Common throughout the district.

Helix nemoralis var. *hortensis* *Mull.*—In woods and hedge banks, occasionally.

Helix nemoralis var. *hybrida* *Poirer.*—This species occurs at Stella Dean, but is not generally met with throughout the district.

Helix arbustorum *L.*—Frequent in woods and on hedge sides amongst nettles.

Helix Cantiana *Mont.*—Not very common. More plentiful nearer Sunderland and on the sea banks adjacent.

Helix rufescens *Penn.*—Does not occur in the district round about Newcastle, but is found occasionally near Sunderland and other parts of the magnesian limestone district.

Helix concinna *Jeffr.* Common on nettles and other plants by hedge sides about Newcastle, where it takes the place of *rufescens*.

Helix hispida *L.*—Common throughout the district.

Helix sericea *Mull.*—In woods, rare. Occurs in woods at Tanfield, and in Bath Wood, Dinsdale, county of Durham. In the vicinity of Rothbury, Northumberland, it occurs somewhat more abundantly.

Helix virgata *DaCosta*.—Occurs occasionally; more frequently on the sea banks near Sunderland.

Helix caperata *Mont.*—Common throughout the district, more especially on a limestone soil. Very abundant on the hills near Rothbury, Northumberland.

Helix ericetorum *Mull.*—Not very common. Occurs at West Boldon, Durham, on a limestone soil, and at various parts of the sea coast between Shields and Sunderland.

Helix rotundata *Mull.*—Common throughout the district. The beautiful greenish white variety has occasionally been found in Benwell Lane and Tanfield, in the county of Durham.

Helix rupestris *Studer*.—In old limestone quarries and old walls. Local, and apparently confined to limestone. Tolerably abundant at Byer's Quarries, nr. Marsden in the county of Durham.

Helix pygmæa *Drap.*—Rather rare; under decayed leaves and in woods, but sparingly.

Helix pulchella *Mull.*—In tolerable abundance throughout the district. Plentiful at West Boldon, in the county of Durham, occasionally met with on St. Mary's Island, near Hartley, and also on the sea banks between Tynemouth and the previously-named place. More plentiful, however, on a limestone soil.

Bulimus obscurus *Mull.* Only occasionally; occurring more plentifully on a limestone soil.

Pupa ringens *Jeffr.*—Rare; found occasionally at Walbottle Dean and Castle Eden Dean, and on the sea banks near Ryhope, also sea banks near to Cullercoats.

Pupa umbilicata *Drap.*—On the sea banks, frequent. Very plentiful at Byer's Quarry, near Marsden, and also at West Boldon, county of Durham.

Pupa marginata *Drap.*—Rare; occurs occasionally in the vicinity of Sunderland and Ryhope, and other districts on the limestone formation. The animal is pale, transparent grey, with two black lines along the back; in other respects agreeing with the character of the genus.

Vertigo pygmæa *Drap.*—Under stones and on old walls, generally in dry situations. Not particularly rare.

Vertigo substriata *Jeffr.*—Rare; in wet moss and in woods. Occurs at Heaton Dean, Tanfield, Gibside, and Stella.

Vertigo pusilla *Mull.*—Rather rare; occurs at Tanfield and near to Crowhall Mill; generally found in damp moss in woods.

Vertigo edentula *Drap.*—Rather rare; occurs at Castle Eden Dean and Ryhope Dean, county of Durham.

Balia perversa *L.*—Frequently met with in moss and on old walls. Occurs in Castle Eden Dean and Ryhope Dean, both in the county of Durham.

Clausilia rugosa *Drap.*—Not uncommon throughout the district, in woods and rocky places. The variety occurs in Tanfield and Castle Eden Dean.

Clausilia rugosa var. **dubia** *Drap.*—Frequently occurs in the district; more plentiful, however, on a limestone formation. Found at Marsden and West Boldon, both in the county of Durham.

Clausilia laminata *Mont.*—In woods throughout both counties, but not very plentiful.

Cochlicopa tridens *Fult.*—Rather rare; on mossy banks and in woods. Rather local, but generally plentiful where it does occur. At Scotswood and Meldon, Northumberland, and at Stella, Castle Eden, and Tanfield, county of Durham.

Cochlicopa lubrica *Mull.* Common throughout the district.

Achatina acicula *Mull.*—Rare. One specimen was found alive in the gardens at Whitley House, also at the roots of an *Ornithogalum* in a garden at Darlington. The shell occurs sometimes on the sands at Tynemouth, probably washed from the banks.

Carychium minimum *Mull.*—Occurs frequently throughout the district, amongst moss and decayed leaves in woods, &c.

Cyclostoma elegans *Mull.*—Found sparingly on sea banks between Cullercoats and Whitley, Northumberland.

Acme lineata *Drap.*—Rare; occurs occasionally in wet moss in Castle Eden Dean, county of Durham.

Gosforth Grove, nr. Newcastle-on-Tyne, March 10, 1874.

Cochlicopa tridens var. *crystallina* (*Dupuy*) nr. Leeds.—A short time ago a young collector brought me for identification a specimen of this variety, taken in Bolton Woods.—JOHN W. TAYLOR, 9, Freehold Street, Leeds.

A White Variety of Limnaea palustris nr. Leeds.—Amongst a quantity of freshwater shells collected at Swillington, near Leeds, and brought to me, was an *albino* of *Limnaea palustris*. This form must be very rare, as it is the only white shell of this species I have ever seen.—J. W. TAYLOR, 9, Freehold St., Leeds.

Cochlicopa tridens var. *crystallina* (*Dup.*) at Petersfield, Hants.—I have taken this variety near Petersfield Hants. The specimen, which was a good one, was found in moss on a bank in a wood, a spot which will long be remembered by me, as I took *Clausilia Rolphii* and *Helix obvoluta* alive for the first time in the same place.—C. ASHFORD, Grove House, Tottenham.

Zonites excavatus var. *vitrina* (*Firsov*) near Huddersfield.—In November, 1872, I found specimens of this variety at Golcar, near Huddersfield, inhabiting exclusively heaps of stones, cinders, and other refuse. All specimens taken since that time have evinced an invariable partiality for a similar habitat.—J. WHITWHAM, Cross Lane, Marsh, Huddersfield.

Helix lamellata (*Jeffreys*) at Huddersfield.—I first met with this species in March, 1870, in Roydas Wood, near Farnley Tyas, about two and a half miles from Huddersfield, and have taken it regularly since that time. It is invariably found among dead beech leaves, and is very local in its distribution, having only been found in two places of limited area within the precincts of the wood up to the present time.—J. WHITWHAM, Cross Lane, Marsh, Huddersfield, March, 1874.

Occurrence of Zonites glaber (*Studer*) at Folkestone.—Having been fortunate enough to find *Zonites glaber* within the last month in an old hedge in the immediate neighbourhood of Folkestone, I thought it might be interesting to your readers to be informed of the fact, as I do not think it has been mentioned as having been found in Kent before. The specimens have been kindly identified for me by T. Rogers, Esq. of Manchester, the original discoverer of the species. The neighbourhood of Folkestone is very rich in conchological treasures, and during the past year I have been constantly adding to the supposed list of local species by fresh discoveries. Besides *Zonites glaber*, I have found *Acme lineata* and the variety *alba* within the last few days.—[Mrs.] J. FITZGERALD, 10, West Terrace, Folkestone, April 14.

LIST OF SHELLS TAKEN AT TENBY, PEMBROKE
SHIRE, AT THE END OF SEPTEMBER, 1872.

BY G. S. TYE.

HELIX PISANA, *Muller*.—Common. Varied in markings and shade of colour; very fine.

HELIX PISANA var. *ALBA*, *Shuttleworth*.—Common. More plentiful in some places than others, and finer.

HELIX VIRGATA var. *SUB-GLORiosa*, *Jeffreys*.—Black Rock only. Plentiful, but not a very good type of this variety.

HELIX VIRGATA var. *SUB-MARITIMA*, *Des Moulins*.—Common. Of every style of marking and shade of its usual colours, the pale brown predominating here, as in other localities.

HELIX CAPERATA, *Montagu*.—Common. Of good size, a dark variety occurring, very distinct and peculiar.

HELIX CAPERATA var. *ORNATA*, *Picard*.—Not very common, but large and decided in marking.

HELIX CAPERATA var. *SUB-SCALARIS*, *Jeffreys*.—Occasionally. Not common; of good size.

HELIX CAPERATA var. *MAJOR*, *Jeffreys*.—Occasionally. Five only, but inferior type.

HELIX SERICEA, *Muller*.—Narberth road. Plentiful on ivy in a hedge-row after a shower.

HELIX SERICEA var. *CORNEA*, *Jeffreys*.—Castle Cliff. Moderately plentiful under herbage.

HELIX SERICEA var. *ALBIDA*.—Narberth road; not very common. This variety, so far as I know, is not noticed by Jeffreys; it may be new. I found one specimen among some shells sent from Cornwall a year ago.

HELIX ERICETORUM, *Muller*.—Gumfrieston road, The Burrows, and the Ridgeway. Plentiful.

HELIX RUFESCENS, *Pennant*.—Here and there. Small, and for the most part unfinished.

HELIX ASPERSA var. *CONOIDEA*, *Picard*.—Castle Hill, &c. Plentiful, but not all of good form.

HELIX NEMORALIS, *Linne*.—Hedge rows; not common.

HELIX NEMORALIS var. *HORTENSIS*, *Muller*.—Hedge rows; not common.

HELIX CONCINNA, *Jeffreys*.—Giltar, near the shore. Only about twelve shells occurred to me (some dead), but of good character.

HELIX RUPESTRIS, *Studer*.—Old walls, &c.; moderately common.

BULIMUS ACUTUS, *Muller*.—Most places. Varied in marking, form, and size.

BULIMUS ACUTUS var. *BIZONA*, *Jeffreys*.—Fields between Tenby and Penally. Moderately common.

BULIMUS ACUTUS var. *INFLATA*, *Jeffreys*.—Fields between Tenby and Penally. Not so common as *bizona*.

PUPA UMBILICATA, *Draparnaud*.—Castle Hill and Black Rock. Fairly plentiful.

PUPA marginata, *Draparnaud*.—Castle Hill and Black Rock. Not very plentiful.

CYCLOSTOMA ELEGANS, *Muller*.—Giltar; somewhat plentiful.

MARINE.

ANOMIA EPHIPPUM, *L.*.—Deep water; dredged.

ANOMIA EPHIPPUM var. *ACULEATA*, *L.*.—Deep water; dredged.

PECTEN OPERCULARIS, *L.*.—Deep water; from the dredgers.

PECTEN VARIUS, *L.*.—Deep water; from the dredgers.

MYTILUS EDULIS var. *INCURVA*, *Penn.*.—Along the shore. In holes in the rocks.

CYPRINA ISLANDICA, *L.*.—Deep water; from the dredgers.

CALYPTREA CHINENSIS, *L.*.—Deep water; from the dredgers.

TAPES VIRGINEUS, *L.*.—Deep water; from the dredgers.

TAPES PULLASTRA, *Mont.*.—Deep water; dredged.

CHITON (? species).—Deep water; dredged.

PATELLA VULGATA var. *INTERMEDIA*, *Jeffr.*.—North Shore; common.

PATELLA VULGATA var. *CÆRULEA*, *L.*.—Giltar; common.

LITTORINA NERITOIDES, *L.*.—On rocks near Merlin's Cave, Plentiful here.

LITTORINA RUDIS, var.—North shore. On rocks; common.

LITTORINA LITOREA, *L.*.—Giltar and North Shore. On rocks; common.

PURPURA LAPILLUS, *L.*.—North Shore & Giltar; very plentiful.

A PARTIAL COMPARISON OF THE CONCHOLOGY OF PORTIONS OF THE ATLANTIC AND PACIFIC COASTS OF NORTH AMERICA.

BY ROBERT E. C. STEARNS.

[From the Proceedings of the California Academy of Sciences, Oct. 7, 1872.]

A striking feature in the Conchological fauna of that part of the Pacific coast included in the Californian and Vancouver zoological province, when compared with the molluscan fauna of the Atlantic coast from the Arctic seas to Georgia, is the preponderance in the former of those forms of molluscan life which are embraced in the order of Scutibranchiata.*

The Scutibranchiate Gasteropods, or shield-gilled crawlers, comprise a great number of mollusks, all of which are marine, and which inhabit the sea shore, principally the littoral and laminarian zones, subsisting on marine vegetation. Thus we find the beautiful group of *Callistoma* upon the larger algae, as well as the unique *Trochiscus* (*T. Sowerbyi*), and *Chlorostoma* crawling over the sedi-

* Vide Adams' "Genera of Recent Mollusca," vol. i., p. 376.

mentary rocks, upon which grows the green *Cladophora*, or some allied vegetable form upon which it feeds, and which also is the favorite food of several species of limpets.

The order of Scutibranchiata, according to the Adams's, includes the families of *Neritidae* (none of which are found in the Californian and Oregonian province, though they begin to appear on the coast of Lower California); and the *Trochidae*, which is largely represented by the following genera: *Eutropia*, one species; *Lepothrya*, three species; *Pachypoma* and *Pomularax*, one species each; *Zlotia*, one (perhaps two) species; *Thiotria* and *Trochisca*, one species each; *Ciliostoma*, *Chilostoma*, *Omphalius*, *Margarita*, and *Gibbula*, each by several species.

The family of *Haliotidae*, which is represented by several species all of large size, widely distributed, and exceedingly numerous in individuals; *Fissurella* including *Lucapina*, *Glyphis*, and *Clypidella*, also *Puncturella* and *Emarginula*.

Dentaliidae by two or more species; *Tecturidae* by several species of *Acmea*, also by *Scurra*; *Gadinia* by one, and *Nacella* by six or more species.

Chitonidae by numerous species and great numbers of individuals.

It may be that some of the groups included by the Messrs. Adams in the order referred to, as our knowledge increases will require to be separated or removed, but so far as the purposes of comparison as made herein are considered, the result will not be materially impaired.

The total number of marine molluscan species and well marked varieties within the Californian and Oregonian province, so far as known and determined, is not far from 630, of which 200 are bivalves; and of the remaining 430, 123 are included within the Scutibranchs. Of this latter number about 40 belong to the *Chitonidae*, and the same number to the *Trochidae*.

Of the 247 gasteropods enumerated by the late Dr. Stimpson in the Smithsonian Institution Check-list, as found from the Arctic Seas to Georgia, 32 only, or less than one-eighth, come within the order mentioned. Of this comparatively small number, seven (7) are *Chitons*, and fourteen (14) belong to the *Trochidae*, while *Haliotis** is without a representative. The *Trochidae* within this province are not represented by such marked or unique characters as distinguish their relatives on the west coast.

Some revision may be required hereafter in the number of Scutibranchiate species credited to the west coast province, as forms now catalogued as distinct may in some instances be united; but, on the other hand, it is not unlikely that new forms undoubtedly distinct will be detected when the coast is more thoroughly explored.

* A solitary specimen of *Haliotis*, of small size, was obtained through dredging in the Gulf Stream, four or five years ago, by Count L. F. Poerstel, of the U.S. Coast Survey, but south of Georgia.

A LIST OF LAND AND FRESHWATER SHELLS,
COLLECTED AT ERITH, KENT.

BY HARRY LESLIE.

The localities referred to in this list lie within about four miles of Erith, all on the Kentish side of the river Thames. Erith itself, or Dartford, are very convenient localities for collectors living in London to visit, being within easy reach by rail. The soil about Erith is a series of sands, gravels, and clays belonging to the London clay or Eocene formation; while at Dartford the chalk crops out. Several of the species recorded are confined to the chalk. They will be noted in the list.

This list does not claim to be, by any means, complete, and merely gives the shells I met with there, collecting at intervals during two seasons:—

Sphærium corneum L.—Rivers Cray and Darent and ditches near them, large.

Sphærium lacustre Mull.—Found in one or two small ponds near Erith, or in the brickfields,

Pisidium amnicum Mull.—River Cray, rather plentiful, and fine.

Anodonta cygnea L.—A variety of this shell, or *A. anatina*, occurred with a few shells approaching to the type of *A. cygnea* in a small brook called the Shuttle, near Bexley. The shells were thick and small. These shells were the only representatives of the genus I found in the neighbourhood, although there were several ponds that looked likely spots for them.

Bythinia tentaculata L.—In the River Cray, and Erith Marshes, abundant.

Hydrobia ventrosa var. *elongata* Mont.—Occurred very plentifully near the Paraffin Works in Erith Marshes, and on the mud and reeds all along the river banks. A few *Hydrobia ulva* occurred with it.

Valvata piscinalis Mull.—In the River Cray.

Planorbis nitidus Mull.—Found only in a small pond by the roadside between Cray-pond and Erith.

Planorbis albus Mull.—River Cray.

Planorbis spirorbis Mull.—Erith Marshes.

Planorbis vortex L.—In most of the small ponds, marshes, and ditches, common.

Planorbis carinatus Mull.—River Cray and mill ponds.

Planorbis complanatus L.—Widely distributed in district. The var. *rhombea* (*Turt.*), occurred in some of the smallest ponds.

Planorbis contortus L.—River Cray and Erith Marshes.

Physa fontinalis L.—River Cray, fine shells; Erith Marshes, plentiful.

Limnæa peregra Mull.—In almost all the small ponds and elsewhere. A small variety approaching the var. *maritima* (Jeffreys), occurred in the ditches, along with *Hydrobia ventrosa*, in brackish water.

Limnæa stagnalis L.—Sparingly in the Darent.

Limnæa palustris Mull.—Mill pond, Dartford.

Limnæa truncatula Mull.—In a small rill in a wood at Caughley Bottom, near Erith, not plentiful.

Limnæa glabra Mull.—Only in a small pond near Northumberland Heath, Erith.

Ancylus fluviatilis Mull.—Plentiful in the River Cray.

Assiminea Grayana Leach—Very abundant along the Thames wall and in the ditches and creeks into which brackish water had access. The finest shells were to be had in the latter situations.

Arion hortensis Fer.—Dartford, on chalk.

Limax agrestis L.—Everywhere in district.

Limax arborum Bouchard-Chantereaux.—In an oak copse at Erith.

Succinea putris L.—Generally distributed in district.

Vitrina pellucida Mull.—In woods.

Zonites cellarius Mull.—Erith, sparingly; more plentiful at Dartford, on chalk.

Zonites alliarius Mull.—In oak copses.

Zonites nitidulus Drap.—The most plentiful Zonites in the district.

Zonites purus Alder.—In oak copses, Erith; also the var. *margaritacea* (Jeffreys).

Zonites crystallinus Mull.—With the last.

Helix aspersa Muller.

Helix nemoralis and var. *hortensis* Mull.—The shells of *H. nemoralis*, from the chalk at Dartford, were larger and thicker than those from the Marshes. *Hortensis* occurred in the Marshes, near Dartford, with

Helix arbustorum L.—Not plentiful.

Helix Cantiana Mull.—Common along the Thames bank.

Helix hispida L., and var. *concinna* F. and H.—Plentiful throughout. A specimen of the var. *albida* (Jeff.) occurred.

Helix aculeata Mull.—In oak woods, Erith, with

Helix fulva Muller.

Helix virgata Da Costa.—At Dartford, on Chalk.

Helix caperata Mont.—Throughout district; also the var. *ornata* (Picard), and var. *major* (Jeffreys), occurred on Thames wall; a variety, with the spire slightly elevated occurred in gravel pit, Erith.

Helix rotundata Mull.—Plentiful throughout.

Helix pulchella Mull.—Sparingly, in brick field, Erith.

Helix lapicida L.—Dead shell at Plumstead.

Bulimus obscurus Mull.—On chalk, at Dartford; also sparingly elsewhere.

Pupa umbilicata Drap. With *H. rotundata* in oak woods.

Clausilia rugosa Drap.—In the brick fields; plentiful also throughout the district.

Clausilia Rolphii Gray.—Plentiful in Belvedere Park, on sandy soil, under chestnut trees; also at Plumstead Common.

Clausilia biplicata Mont.—Two shells amongst the tidal refuse on the shore at Dartford Creek.

Clausilia laminata Mont. and var. *pellucida* (Jeffreys).—At Dartford, on chalk.

Conovulus denticulatus var. *myosotis*.—Very abundant on the Thames banks, with *Assiminea Grayana*, &c.

Garychium minimum Mull.—In woods, Erith.

Cylostoma elegans Mull.—At Dartford, on chalk only.

Zua lubrica Mull.—Not very plentiful in Erith.

The following analysis of the fifty-four species I found there may be interesting:—

Pisidium amnicum, *Planorbis albus*, *P. carinatus*, *Ancylus fluviatilis*, *Limnaea stagnalis*, and *Valvata piscinalis*—occurring in the rivers Cray and Darent.

Hydrobia ventrosa, *Assiminea Grayana*, *Conovulus denticulatus*, and *Clausilia biplicata*—all occur within reach of the tide.

Helix aculeata, *H. fulva*, *Limax arborum*, and *Clausilia Rolphii*—occur only in woods and uncultivated land.

Clausilia laminata, *Cylostoma elegans*, and *Helix virgata*—occur on the chalk at Dartford only.

Limnaea glabra, *L. truncatula*, and *Planorbis nautilus*—were found each in only one spot in the district.

The remaining thirty-four species may be regarded as of general occurrence in the district.

6, MOIRA PLACE, Southampton.

A VARIETY OF LAND SHELL NEW TO BRITAIN. (*CLAUSILIA RUGOSA*, VAR. "SCHLECHTII," ZELEBOR.)

BY W. D. SUTTON.

Having been fortunate enough to find during the last few months a new and distinct variety of *Clausilia rugosa*, hitherto not noticed as occurring in Britain, and which has been kindly determined for me by that eminent authority, J. Gwyn Jeffreys, Esq., LL.D., F.R.S. (through Mr. G. Sherriff Tye, who was the

first to notice the distinctness of the shell), I send a description of it for the information of your readers and conchologists in general, as also the remarks made upon this variety by the same authority, who has favoured me with his matured opinion respecting them, and his researches in the matter have brought him to the following conclusion:—

He considers it to be the variety *Schlechtii*, of Zelebor, whose description of it is published in the monograph of Adolph Schmidt, entitled "Die Kritischen Gruppen der Europäischen Clausilién," 1857, page 40. *Claus. dubia* (Draparnaud g.), var. *Schlechtii*, Zelebor. *Gracilis, cerasiova, nitidula, striatula, raro, strigillata, carina valida.* Long. 12, diam. $2\frac{1}{4}$ — $2\frac{1}{2}$ millim. Apl. $2\frac{1}{2}$ millim longa, $1\frac{2}{3}$ lata. Fig. 94, 95, 198.

Mr. Jeffreys further remarks:—"I believe this is the same variety which Pareyss, of Vienna, has named *eximia*, but that name has not been published;" adding, "The intermediate gradations between *Clausilia rugosa* and its variety *dubia* are very numerous." The new variety referred to is apparently confined to one or two spots in the counties of Northumberland and Durham, the best specimens being found in the latter county, in a particular locality not far from the coast. They are generally larger, more elongated, smoother, and more transparent than *C. rugosa* var. *dubia*, the colour is likewise different: whereas the latter attains occasionally a fine purple colour, and runs generally through the usual shades of brown to purplish brown, the former appears only in a pale brown form, frequently resembling, in external appearance, "*Clausilia laminata*," both in smoothness and transparency.

GOSFORTH GROVE, near Newcastle-upon-Tyne,

June 12th, 1874.

Zonites glaber (Studer) nr. Huddersfield. In the early part of May last I collected several very fine specimens of *Zonites glaber* about $2\frac{1}{2}$ or 3 miles from Huddersfield. It was not plentiful, its range being limited to a very few yards. If the place is not disturbed, I have no doubt that in the autumn I shall be able to collect a good number of it, as the place seems very suitable to the habits of the *Zonites*, as there is plenty of cover for them—herbage and light soil in summer, and stones in winter.—LISTER PLACE, Hebble Terrace, Bradford Road, Huddersfield.—June 8th, 1874.

On the occurrence of *Clausilia rugosa* var. *albida* and *Pupa umbilicata*, var. *alba* at Pateley Bridge—On Whit-Monday, May 25th, 1874, in company with my friend, Mr. J. Whitwham, I paid a visit to Pateley Bridge for the purpose of

collecting shells, and was rewarded with two specimens of *Claustrilia rugosa* var. *albida*. I also collected several specimens of *Pupa umbilicata* var. *alba*. Had our time not been limited to almost a few minutes, I have no doubt that we should have been able to collect several specimens of this rare variety of *Claustrilia rugosa*. We also collected *Balia perversa* for the first time.—
LISTER PEACE, Hebble Terrace, Bradford Road, Huddersfield.

Note on the habitat of Neritina tristis (Orbigny).—M. Mazè, in his catalogue of Martinique shells, (*Journal de Conchyliologie*, 1874, p. 173), says that the above is a freshwater species. My experience in Jamaica was just the reverse. The only locality where I found it was at a place on the north coast of the island called Rio Bueno (but which is no more a river than Rio Janeiro). It occurred in immense numbers on the rocks of the open coast, together with *Nerita peleronata* and *versicolor*, *Littorina muricata*, and other marine species. It would appear that several species of Neritina inhabit both fresh and salt water. I found this to be the case with *N. virginica*, as I have mentioned in "*Journal de Conchyliologie*," 1872, p. 37. I should be glad to know if there is any difference in size between marine and freshwater specimens of *N. tristis*. If the same ratio obtains as in *N. virginica*, freshwater specimens of *N. tristis* ought to be about half an inch in diameter, at least.—C. P. GLOYNÉ, Cork.

REVIEW.

Catalog der Conchylien-Sammlung von Fr. Paetel.
Nebst Uebersicht des Angewandten systems. Berlin, Verlag von Gebrüder Paetel, 1873.

A good catalogue, at a reasonable price, has long been a desideratum with collectors of shells. This want has been well met by the publication of a classified catalogue of the extensive collection of Dr. Paetel, the title of which we give above. It is a small volume of 172 pages, costing in London only 4s. 6d., and contains a carefully classified list of about 13,000 species, named according to the most modern authorities.

The first twenty-three pages are devoted to a systematic table of orders, families, genera, and sub-genera, with the synonyms of most frequent occurrence; and the rest of the book, except fourteen pages of index, is taken up with the catalogue of species, which are alphabetically arranged under each genus, and have the sub-genus or section denoted by a figure prefixed to each species and referring to the preceding table.

We cannot better illustrate the method followed than by briefly describing a single genus. Selecting for this purpose the genus *Murex*, we find that in the table of genera it is placed at the head of the Gasteropoda, and is divided into ten sub-genera,

or (as we prefer to call them) sections, numbered consecutively as follows :—

- SUB-GENUS I. *Murex L.*
2. *Haustellum Klein.*
 3. *Rhinocantha H. Ad.*
 4. *Chicoreus Montfort.*
 5. *Pteronotus Swain.*
 6. *Phyllonotus Swain.*
 7. *Vitularia Swain.*
 8. *Homalocantha Mörch.*
 9. *Ocenebra Leach.*
 10. *Muricidea Swain.*

Turning now to the catalogue we find, under *Murex* (L.), a list of 164 species and a few varieties, the figure prefixed to each referring to the above list of sections.

Thus to the first section are ascribed 20 species, including *M. tenuispina* (Lam) and its allies.

Of § 2 there are 4 species, one of which of course is *M. haustellum* (L.), whilst of § 3 there are only two examples, viz., *M. Brandaris* (L.), and *M. cornutus* (L.). Of § 4, which comprises some of the most elegant forms, there are 32 species, of which *M. palmarosa* (Lam) may be cited as a good type. Of § 5, which includes *M. pinnatus* (Wood) and its allies, there are 15 species, and of § 6 there are 26 species, including *M. regius* (Wood), *M. brassica* (Lam), &c. We find 10 species referred to § 7, but some at least of these do not belong to *Murex*. *Vitularia* is now usually placed with the Purpuride, to which family it clearly belongs. The best known species is *Vitularia salibrosa* (King). Of § 8 only *M. rota* (Sen) and two others are given, but of § 9 there are 30 species, of which no better type can be given than the familiar *M. erinaceus* (L.). To § 10 are referred 22 species, including *M. octogonus* (Quoy), &c.

To every species, with few exceptions, a locality is given, in some cases sufficiently vague to include a tolerably wide range, e. g., oc. Ind. (Indian Ocean), but in others, especially among the land shells, more precise. There are, as might be expected, a few errors and inaccuracies, arising partly from mistakes in classification, and partly from inadvertence; but, on the whole, the work is very well done, and cannot fail to be acceptable to the student and collector of recent shells.

A. W. L.

BIBLIOGRAPHY.

LANKESTER, E. RAY.—“Observations on the development of the Pond-snail (*Lymnaeus stagnalis*), and on the early stages of other Mollusca.”—*The Quarterly Journal of Microscopical Science for October, 1874*, vol. xiv. (new series), pp. 365 to 391, with woodcuts and plates xvi. and xvii.

Mr. Lankester first gives remarks on some of the developmental phenomena exhibited by the mollusca generally, and in the second part of his paper he details his investigations into the development of the particular species under consideration.

GUPPY, R. J. L.—“On the West Indian Tertiary Fossils,” by R. J. Lechmere Guppy, F.L.S., F.G.S.—*Geological Magazine for October, 1874*: New series, Decade II., vol. i., p. 433—445; with plates xvi., xvii., and xviii. (continued from the September number, p. 411).

Mr. Guppy characterizes the following new species of fossil mollusca:—*Strombus pugiloides*; *Murex collatus* (pl. xvi. 8); *Ancillaria pinguis* (pl. xvi. 3); *Cassis reclusa*; *Monodonta basilea* (pl. xvi. 2); *Trochus decipiens* (pl. xviii. 18); the same, var. *laticarinatus* (pl. xviii. 19); *T. plicomphalus* (pl. xviii. 17); *Vitrinella marginata* (pl. xviii. 21); *Crucibulum piliferum*; *C. subsutum* (pl. xviii. 4); *Dexox fabugelloides* (pl. xviii. 10); *Venus Blandina* (pl. xvii. 8); *Chama involuta* (pl. xvii. 5); and *Plicatula vexillata* (pl. xvii. 7).

At the end of the paper is a complete list of the fossil mollusca (253 species) hitherto discovered and recorded from the tertiary rocks of the Caribbean area (exclusive of the post-pleiocene). The distribution of the species in the ten formations of these rocks is shown in a tabular form, a column being given to each formation, and an additional column shows the range of each outside the limits of the Caribbean area.

The following articles appear in the French “*Journal de Conchyliologie*,” edited by M.M. CROSSE and FISCHER, 3^e série, tome xiv., Nos. 1 and 2, for January and April, 1874.

Pages 120—136 of the January number, and 217—220 of the April number, are devoted to Bibliography and Paleontology.

I. MOUSSON, A.—“Coquilles terrestres et fluviatiles recueillies par M. le Dr. Alex. Schlœfli en Orient” (land and freshwater shells collected in the east by Dr. Schlœfli).—No. 1, pp. 1—60.

This is a very complete catalogue of the species collected chiefly in Mesopotamia, to which Prof. Mousson has added some general considerations on the Mesopotamian fauna. The following species are described as new:—

Helix Derbentina, Andrzejowski, var. *suberrans*, Mousson; *H. muscicola*, Bourguignat, var. *Merssinæ*, Ms.; *Chondrus septem-dentatus*, Roth, var. *borealis*, Ms.; all from Merssina. *Helix commata*, Mousson; *H. Mesopotamica*, Ms.; *H. Escheriana*, Ms.; *Chondrus arctespira*, Ms.; *Pupa scaphus*, Frivaldszky, var. *Mesopotamica*, Ms. (perhaps a separate species); *Neritina rufa*, Ms.; from Upper Mesopotamia. *Bulininus Samaraensis*, Ms.; *Aciula minuta*, Ms.; *Limnea Euphratica*, Ms.; *L. canaliculata*, Ms.; *L. hordeum*, Ms.; *Physa lorata*, Ms.; *Planorbis devians*, Porro, var. *Euphratica*, Ms.; *P. intermixtus*, Ms.; *Bythinia erecta*, Ms.;

Melanopsis nodosa, Férussac, var. *moderata*, Ms.; *Neritina Eu-phratica*, Ms.; *A. Schloglii*, Ms.; *A. dentata vesiculata*, Bourguignat, var. *Mesopotamica*, Ms.; *A. Schloglii*, Ms.; *Cyrina Tigriais*, Ms.; all from the lower part of the same province.

2. MORELET, A.—“Sur l’*Achatina Dohrniana* de Pfeiffer.”—No. 1, pp. 60—62.

The author points out that *A. Dohrniana* differs from *A. Welsitschii* by having one whorl less, by longitudinal bands of a second epidermis, and by its finer and more irregular sculpture.

3. DESHAYES, G. P.—Description d’un Cône nouveau des Antilles (description of a new Cone from the West Indies).—No. 1, pp. 62—66.

Conus Mazzi, Desh., from Martinique (Pl. i., fig. 1) is distinguished by its elongated form, its thin and semi-transparent shell, and its coloring, which much resembles that of *Voluta junonia*, viz., yellowish white, with nine rows of large chestnut-colored spots.

4. CROSSE, H.—Description du nouveau genre *Ravenia* (description of the new genus *Ravenia*).—No. 1, pp. 66—70.

This curious genus is, as it were, intermediate between *Spiraxis* and *Pupa*, having the peculiar twisted columella of the former, and the strong internal tooth of the latter, but is really more nearly akin to the former genus. The only species known, *R. Blausti*, Crosse (Pl. ii., fig. 4), is from the islet of Les Roques, near Curaçao.

5. LIENARD, E.—“Description d’un *Murex* nouveau provenant de l’île Maurice” (description of a new *Murex* from the Mauritius).—No. 1, pp. 70, 71.

Murex Crossei, Liénard (Pl. i., f. 2).

6. CROSSE, H.—“Description des Mollusques nouveaux” (descriptions of new mollusca).—No. 1, pp. 71—76.

Helix Maenili, Crosse, from Nicaragua (Pl. ii., fig. 3); *Rumina decollata*, L., var. *maura*, Cr., from Morocco (Pl. ii., fig. 6); *Murex Liénardi*, Cr. (Pl. iii., fig. 4), and *Terebratula Cernica*, Cr. (Pl. i., fig. 3), both from the Mauritius.

7. CROSSE, H., and FISCHER, P.—Description du nouveau genre *Euptychia* de Madagascar (description of the new genus *Euptychia* from Madagascar).—No. 1, pp. 76—82.

A most extraordinary genus of Cyclostomidae, distinguished by the projecting lamella of the last whorl, and by its operculum, which has externally the appearance of that of a *Cyclostoma* or *Cetopoma*, but is thin and horny.

The only known species, *E. metableta*, Cr. and Fisch., is described and figured (pl. i., fig. 5).

8. CROSSE, H.—Descriptions des Mollusques terrestres nouveaux provenant de l’île d’Haiti (descriptions of new terrestrial mollusca from Haiti).—No. 1, pp. 82—89.

Choanopoma Newcombi, Crosse; *C. Gabbi*, Cr.; *C. Moreletti*.

anum, Cr.; *Helicina Gabbi*, Crosse and Newcomb.

M. Crosse considers that *Achatina Gundlachi*, Pfeiffer, really belongs to the genus *Geostilbia*.

9. CROSSE, H.—Catalogue des espèces du genre *Meroe*, accompagné de la description d'une espèce nouvelle (catalogue of the species of the genus *Meroe*, with description of a new species).—No. 1, pp. 89—97.

The new species is *M. Retersiana*, Crosse (Pl. iii., fig. 7), habitat unknown.

10. CROSSE, H.—Descriptions des Mollusques inédits provenant de la Nouvelle Calédonie (descriptions of unpublished mollusca from New Caledonia).—No. 1, pp. 98—104.

Helix Calliope, Crosse (pl. ii., fig. 1); *H. Alleryana*, Cr. (pl. iii., fig. 5); *H. Nouméensis*, Cr. (pl. iii., fig. 6); *H. minutula*, Cr. (pl. ii., fig. 2); *Bulimus Pancheri*, Cr. var. *beta* (pl. ii., fig. 5); and *Scalaria Mariei*, Cr. (pl. ii., fig. 7).

11. CROSSE, H.—Diagnoses Molluscorum Novae Caledoniæ incolarum (diagnoses of Mollusca inhabiting New Caledonia).—No. 1, pp. 104—112.

12. CROSSE, H.—Diagnoses Molluscorum in fluminibus provincie Nankingensis collectorum (diagnoses of mollusca collected in the rivers of the province of Nankin, by the Rev. Father Heude).—No. 1, p. 112—118. Chiefly Unionidae.

13. CROSSE, H.—Diagnoses Molluscorum Martinicensium novorum (diagnoses of new mollusca from Martinique).—No. 1, pp. 118—119.

These last three articles contain the Latin diagnoses of many species, published in advance of the French descriptions, in order to secure priority. As the full descriptions in French, with observations and colored figures, almost invariably follow in succeeding numbers of the Journal, we do not now enumerate the species, in order to avoid repetition.

14. FISCHER, P.—Observations anatomiques sur divers Mollusques des Antilles attribués au genre *Succinea* (anatomical observations on various West Indian Mollusca attributed to the genus *Succinea*).—No. 2, pp. 139—156, and plates v. and vi.

A highly important article, in which the author proves by the examination of the lingual ribbons and jaws that *Succinea patula*, Bruguière, *S. rubescens*, Deshayes, and *S. depressa*, Rang, belong really to the *Bulimulidae*, a family also comprising *Graellsia*, *Peltella*, and *Simpulopsis*, and distinguished by a thin jaw with oblique folds so arranged that the two median ones form an angle in the centre of the jaw. He proposes to include these three species in the genus *Amphibulima* (hitherto only containing the species *patula*, and wrongly considered as a sub-genus of *Succinea*). The fourth species examined by Dr. Fischer, *Succinea unguis*, Péruccac, proves itself to be a true *Succinea*, its jaw having the quadrangular projection characteristic of the genus.

15. FISCHER, P.—“Note sur le *Turbo phasianellus*, Desh.” (note on *Turbo phasianellus*).—No. 2, pp. 156, 157.

The operculum of this species, which has been lately discovered, proves it to belong to *Terebrus* instead of *Turbo*. Besides its original locality, Réunion, it has also been found near New Caledonia.

16. MAZE, H.—“Catalogue des coquilles terrestres et fluviales recueillies à la Martinique en 1873” (catalogue of land and fresh water shells, collected at Martinique in 1873).—No. 2, pp. 158—173.

A very complete list of the species inhabiting the island of Martinique, with much information respecting their habitats, the altitude at which they are found, and the colors of the animals.

Helix lychnichus, Müller (really found in Guadeloupe, Desirade, and St. Martin's); *H. nigrescens*, Wood (from Dominica); *H. pachystoma*, Gray (from Guadeloupe); *H. stenostoma*, Pfeiffer; *H. crassidens*, Pfeiffer (only a variety of *H. nucleola*); *Cyclophorus rubescens*, Sowerby; *C. cinereus*, Drouët; *Cyclotus Martinicensis*, Shuttleworth, and *Cheanoëma occidentale*, Pfeiffer, are wrongly attributed to Martinique. *Bulimus Mazei*, Cr., found in damp moss on the Pitons, at height of 730 mètres (pl. iv., fig. 3), and *Helicina euglypta*, Cr., found under stones in shady paths near Fort de France (pl. iv., fig. 4), are new species. *Helicina Mazei*, Crosse, from the Pitons, is now considered a variety of *H. Antillarum*, Sowerby.

17. MÖRCH, DR. O. A. L.—Descriptions des trois espèces de Mytilacées nouvelles de la Norvège (descriptions of three new Norwegian Mytilaceæ).—No. 2, pp. 173—176.

Mytilus Boeckii, Mörch; *M. diluculum*, Mörch; and *M. pusillus*, Philippi, var., all found at a depth of 16—21 fathoms at the Island of Udo, near Mandal.

18. MÖRCH, DR. O. A. L.—“Sur le genre *Malletia*” (on the genus *Malletia*).—No. 2, pp. 177—179.

Dr. Mörch considers that the shell described by Sars as *Vestia obtusa*, really belongs to this genus, which had hitherto only been found on the coasts of the southern portion of South America.

19. MORELET, ARTHUR.—“Description d'une Hélice nouvelle du Maroc” (description of a new *Helix* from Morocco).—No. 2, pp. 179—180.

H. vernuculosa, Morelet, from nr. Hir, in the province of Sous.

20. CROSSE, H.—“Descriptions d'espèces de Mollusques inédits provenant de la Nouvelle Calédonie” (descriptions of unpublished species of mollusca from New Caledonia).—No. 2, pp. 180—186.

Helix Bazini, Crosse (pl. iv., fig. 1); *H. taslei*, Crosse (pl. iv., fig. 2); *Bulimus Alexander*, Crosse, var. α ; *B. porphyrostomus*, Pfeiffer, var. δ ; *B. Olivaceus*, Dotzauer, var. γ ; *Helicina Gassiesiana*, Cr. (pl. iv., fig. 6); and *H. Numidianic*, Cr. (pl. iv., fig. 7).

21. SOUVERBIE, Dr., and MONTROUZIER, Rev. Father.—“Description d'espèces nouvelles de l'Archipel Caledonien,” by Dr. S. (20th article), and Rev. Father M. (17th article).—No. 2, pp. 186—202.

Pleurotomia Rougeyroni, Souverbie (pl. vii., fig. 1); *P. Gilberti*, Souv. (pl. vii., fig. 2); *P. (Daphnella) varicosa*, Souv. (pl. vii., fig. 3); *P. scalata*, Souv. (pl. vii., fig. 4); *P. Moquiniana*, Montr. (pl. vii., fig. 5); *Lophocerous Souverbiei*, Montr. (pl. vii., fig. 6); *Natica Gaitei*, Souv. (pl. vii., fig. 7); *Pecten Lamberti*, Souv. (pl. vii., fig. 9).

The operculum of *Naticina papillaris* is figured (pl. vii., fig. 8), and that of *Neritopsis radula*, L., is described.

22. CROSSE, H.—A technical description of the new Martinique shells noticed above (see No. 16, Mazé's catalogue).—No. 2, pp. 202—205.

23. FISCHER, P.—Diagnoses of new species.—No. 2, pp. 205—206.

See Note to Nos. 11—13.

24. CROSSE, H.—Diagnosis of a new species.—No. 2, pp. 206—207.

25. GASSIES, J. B.—“Description de Mollusques terrestres et fluviaires provenant de la Nouvelle Calédonie.” No. 2, pp. 207—216.

Helix saburia, Gassies; *Cassidula pilosa*, Gas.; *C. truncata*, Gas.; *Melampus exesus*, Gas.; *M. strictus*, Gas.; *Hydrocena rubra*, Gas.; *Hydrobia Crosseana*, Gas.

C. P. G.

REPRINTS.

“*Salpa spinosa* (Ott) off the West Coast of Ireland.—I first found this oceanic mollusk in August, 1869, when it was floating near the surface of the sea, in great abundance, between Golam Head and the Isles of Arran. Again, this season, I have met with it plentifully in the vicinity of the Skira Rocks, and around Deer Island, to the south-west of Roundstone, in Connemara.—A. G. MORE, Dublin, Sept. 4, 1874.”—Zoologist for October, 1874; S.S., vol. ix., p. 4202.

THE PECTENS, OR SCALLOP-SHELLS.

BY R. E. C. STEARNS.

[From the *Overland Monthly* for April, 1873.]

The Ocean heaves resistlessly,
And pours his glittering treasures forth;
His waves, the priesthood of the sea,
Kneel on the shell-gemm'd earth,
And there emit a hollow sound,
As if they murmured praise and prayer;
On every side 'tis holy ground—
All nature worships there!—VEDDER.

Of the many beautiful forms which live in the sea, perhaps none are more attractive or deservedly popular than the pectens, or

scallop-shells. The tumbler on the sea shore rejoices in a prize when the odd valve of a scallop is detected in some out-of-the-way nook, covered up and hidden like a treasure, among the sea wrack, mingled in strange confusion, with dead crabs, star-fishes, delicate corals and algae—the flotsam and jetsam of the winter storms; and when a specimen of unusual vividness of colour and perfectness of sculpture is obtained, an exclamation of triumph mingles with the murmuring music of the surf.

The fairer sex esteem these shells highly, but not from an edible point of view, as do their sterner brethren; for though the animal, or soft part, when *fresh*, is really a great delicacy, the valves, or two pieces of which the complete shell is composed, are utilised in various ways, and with that ingenuity peculiar to the sex, through which "inconsidered trifles" are converted into forms of beauty, an accession of scallops is sure to be followed by a harvest of pincushions and needle-books.

In natural history the scallops are known as *Pectens*, from a fancied resemblance of the radiating ribs which most of them display to the teeth of a comb; but as the forms of combs are subject to the caprices of fashion, the pertinency of the name is not altogether apparent. They are also called fan-shells, which is far more appropriate. Though included by the public in the term shell-fish, as are also the clams, quahangs, and cockles, they are in no way related to the fishes, but belong to the division of the animal kingdom known as mollusca, or soft-bodied animals (from the Latin word, *mollis*, soft), as do the cuttles, snails, conchs, oysters, and mussels.

The genus *Pecten* was established by the naturalist Bruguière, to distinguish these shells from the oysters, with which they were formerly classed. The shells of this genus, of which two hundred species are known, have a wide geographical distribution, being found in almost every sea. In most of them, the valves, as the two pieces are termed which form the perfect shell, are externally convex, but in others one is convex and the other flat. They frequently exhibit most elaborate and exquisite sculpture, and extreme brilliancy of colour. One group, which is peculiar to the coral areas of the Indo-Pacific waters, known as the mantle shells (*Pallium*), resembles fine embroidery in sculpture and coloration. Many of the forms which inhabit the colder seas, either north or south of the equator, are notable for their beauty; a single species frequently indulges in a differentiation in colour and markings. The larger species of the fan-shells are found in the colder waters of the North Atlantic and North Pacific (Puget Sound and Japan); also, in the Straits of Magellan, and the similarity of form and sculpture in the shells from these widely separated regions is quite remarkable. Other illustrations of the pectens are found on the west coast of North America, and one species is quite abundant at San Diego.

The fan-shells or scallops were known to the ancients; they were called *Klévec* by the Greeks, and the *Ktēs* of Xenocrates and Galen is said to be the *Pecten maximus* of modern authors. According to Athenaeus, this or an allied species was used by the ancients for medicinal purposes as well as food.

In England they are called "frills," or "queens" in south Devon, according to Montagu; and on the Dorset coast the fishermen call them "squimns." In the north of France, one kind bears the name of "*vanneau*" or "*olivette*," and another species (*P. maximus*) is an article of food. Of the latter, Jeffreys, a British conchologist, says: "If the oyster is the king of mollusks, this has a just claim to the rank and title of prince." In the fish markets of the north of France, it is called "*grand-pelerine*," "*gofiche*," or "*palourde*." In the south of England, it shares with another species the name of "frill," and in the north that of "clam."

This species (*P. maximus*), Jeffreys says, was formerly "plentiful in Lulworth Bay, on the Dorset coast; but now they are rarely found alive. I was told that the breed had been exterminated there by an epicurean officer of the coast-guard. The late Major Martin would permit any Conchologist to dredge as much as he pleased in the bays of the Connemara coast, providing he only took useless shells,.....but all the big clams (*P. maximus*) were reserved for the table at Ballynahinch Castle." The high reputation of this species causes it to be much sought after, and it "is a constant visitant of the London markets. Scalloped with bread crumbs in its own shell, or fried with a little butter and pepper, it forms a very delicious morsel."

The *Pecten irradians* is the common species on the coast of New England. In the winter the "meats" are sold in the Boston market by the quart, and are called "scallops." They are obtained on the shores of Rhode Island. It is somewhat singular that the San Diego scallop has not been introduced into the San Francisco markets; it will be, undoubtedly in the course of a few years. It may, however, be less palatable than those above referred to, as all the species named inhabit waters that have a much lower temperature during the greater part of the year than the sea at San Diego.

The scallops are, and have been, esteemed for food and other purposes by the aboriginal tribes, as well as by their civilized successors. In the shell-heaps of Florida, among the *Kjækken-uddings*, or kitchen-refuse, we find great numbers of these shells, especially in a heap at Cedar Keys; and the shells of some of the west American species, found in Puget Sound, are now used by the Indians of that neighbourhood, for in the ethnological department of the Smithsonian Institution at Washington (specimens 4773-4-5) are rattles made of valves of the *Pecten hastatus*, which were used by the Makah Indians in the vicinity of Necah Bay in

their dances; and another specimen (No. 1034) is a rattle made from the convex valves of a larger species (*Pecten caurinus*) and formerly used as a medicine rattle. These rattles are made by piercing a hole through the valves and stringing them upon a willow, or similar twig.

The animal of the fan-shells is exceedingly beautiful. The mantle, or thin outer edge, which is the part nearest the rim or edge of the valves, conforms to the internal fluted structure of the latter, and presents the appearance of a delicately pointed ruffle or frill. This mantle is a thin and almost transparent membrane, adorned with a delicate fringe of slender, thread-like processes or filaments, and furnished with glands which secrete a colouring matter of the same tint as the shell; the valves increase in size, in harmony with the growth of the soft parts, by the deposition around and upon the edges of membranous matter, from the fringed edge of the mantle which secretes it. This cover is also adorned with a row of conspicuous round black eyes (*ocelli*) around its base. The lungs or gills are between the two folds of the mantle, composed of fibres pointing outward, of delicate form, and free at their outer edges, so as to float loosely in the water. The mouth is placed between the two inmost gills, where they unite; it is a simple orifice, destitute of teeth, but with four membranous lips on each side of the aperture.

The pectens have also a foot, less developed than in some others of the bi-valve mollusks, which resembles a crooked finger, and is capable of enlargement and contraction, and assists the animal in moving about on the bottom of the sea. Some of them have a sort of beard (*byssus*), at least when young, by which they attach themselves to rocks, seaweeds, and other marine bodies, as do the mussels, which are also bearded; while others of the scallops live without attachment, and move through the water with considerable celerity, with a jerking motion, caused by the rapid opening and closing of the two valves, producing a recoil which carries them along sideways. The young shells of some species dart with great rapidity, a single jerk carrying them several yards. The writer has frequently watched the Atlantic species (*P. irradians*), and when taken from the water, and as long as life continues, the animal will open the valves and shut them with a snap, the operation producing a short, sharp, percussive sound.

The mechanism by which respiration and nutrition are secured is elaborate and exceedingly interesting. The filaments of the gill fringe, when examined under a powerful microscope, are seen to be covered with numberless minute, hair-like processes, endowed with the power of rapid motion. These are called *cilia*, and when the animal is alive and *in situ*, with the valves gaping, may be seen in constant vibration in the water, generating, by their mutual action, a system of currents by which the surface of the gills is laved, diverting toward the mouth animalcules and other small

nutritious particles.

The shell of the scallops consist almost exclusively, says Dr. W. B. Carpenter, of membranous laminae coarsely or finely corrugated. It is composed of two very distinct layers, differing in color—and also in texture and destructibility—but having essentially the same structure. Traces of cellularity are sometimes discoverable on the external surface, and one species (*P. nobilis*) has a distinct prismatic cellular layer externally. As the idea of the Corinthian *capital* is believed to have been suggested to Callimachus, the Grecian architect, by a plant of the Acanthus growing around a basket, it is quite possible that the fluting of the Corinthian *column* may have been suggested by the internal grooving of the pecten shells.

Aside from their physiology and the position in the order of Nature occupied by the scallops, they have a place in history and song; for, "in the days when Ossian sang, the flat valves were the plates, the hollow ones the drinking cups, of Fingal and his heroes." The common Mediterranean scallop (*Pecten Jacobaeus*), or St. James' shell, was, during the Middle Ages, worn by pilgrims to the Holy Land, and became the badge of several orders of knighthood. "When the monks of the ninth century converted the fisherman of Genneserat into a Spanish warrior, they assigned him the scallop shell for his 'cognizance.'"

CONCHOLOGICAL NOTES.

The Genealogical Import of the External Shell of Mollusca.—Mr. E. R. Lankester read a paper on this subject before the Biological section of the British Association for the Advancement of Science, at its meeting in Belfast, last August, in the course of which he referred to what had been called the recapitulation hypothesis, according to which all living things in their development present a rapid series of pictures or dissolving views of their ancestors, arranged in historical order. Applying this to the human race, he said that the earliest commencement of a human being was a small speck of protoplasm of mucus-like consistency, such as existed in ponds. A later stage exhibited him as a small sac, composed of two layers of living corpuscles, which he inherited from polyp-like ancestors, and was to-day seen in polyps. Still later he was an elongated creature, with slits in the side of the neck, which, like the gill-slits of a shark, he inherited from a shark-like ancestor. Six months after birth the child continued to inherit qualities from its ancestors, viz., from those which crawled on four legs; and at a later period certain irrepressible tendencies made it clear that qualities were inherited from climbing and shrieking animals. Mr. Lankester then went into an elaborate description of certain molluscs with a view of

showing that the pen (the "cuttle-bone" or sepiostaire) of the Cephalopod is homologous with the shell of the lower mollusca.

Professor Huxley thought that the position had been well established. Mr. Lankester's attempt to reduce to one form the immense variety of shells in molluscous animals was exceedingly important.

Dr. Carpenter also said that he was almost prepared to receive the conclusion at which Mr. Lankester had arrived.

Dr. Michael Foster added his testimony to the value of Mr. Lankester's observations, and said that part of the work accomplished was due to the establishment of the Zoological station at Naples.

The Cambridge Museums and Lecture Rooms Syndicate, in their eighth annual report state that among the additions which have been made to the collections in the several museums, the bequest of the late Mr. M'Andrew, F.R.S., of the whole of his collection of shells and other specimens, deserves the first mention, as it is a gift of the highest scientific value.

ACADEMY OF SCIENCES, PARIS, SEPT. 7, 1874.—M. Frémy in the chair.—On some phenomena of localisation of mineral and organic substances in Mollusca, Gasteropoda, and Cephalopoda, by M. E. Heckel. Specimens of *Helix aspersa* and *Zenites algirus* were fed with white lead, or acetate of lead mixed with wheat flour.—An accumulation of metal was found in the liver and also in the cerebral ganglia. *Loligo vulgaris*, *Sepia officinalis*, and *Octopus vulgaris* were fed during two months with garancine (mixed with meat). In no case was the internal shell coloured, but the cephalic cartilage and all the cartilaginous portions of the skeleton of these Mollusca were coloured after an experiment of three months' duration. The author points out the necessity of distinguishing clearly the hard parts belonging to the skeleton from those belonging to the shell.

In February last the honorary degree of LL.D. was conferred upon the distinguished conchologist, Mr. John Gwyn Jeffreys, F.R.S., by the University of St. Andrews.

Within the past month has been announced the death of Mr. Bryce McMurdo Wright, well known as a collector of fossils and shells.

BURROWING AND PERFORATING MOLLUSCS.

By W. D. SUTTON.

Prominent amongst this class may be named the "*Pholas dactylus*." If an examination be made at low water of such portions of the chalky rocks and white cliffs of which this island is composed, more especially those portions which run well out to sea, they will frequently be found to be perforated with numerous holes, which run to a considerable depth, and vary considerably in their dimensions. The holes are made by that remarkable little animal the "*Pholas dactylus*." It does not appear to be clearly ascertained how the operation is performed, and it is all the more wonderful how hard rocks and timber can be so perforated, seeing that the shell of the animal is by no means hard and capable of acting as a file. However, for the sake of argument, taking it for granted that the shell were used as a boring tool, then the hole made would be nearly circular, instead of, as is really the case, being accommodated to the shape of the shell. Few materials are proof against their ravages, and such hard substances as oak, sand-stone, limestone, or chalk, frequently form their habitations, and it is a well-known fact that such solid stone as the Plymouth breakwater was very soon attacked by these creatures. They are particularly obnoxious to the constructors of wooden piers, and very soon reduce to a honeycombed state the submerged portions of the piles, and the only way to protect the same with any degree of immunity from their ravages is to drive iron nails closely into the submerged portions, and they will bid defiance to the *Pholas*, as they cannot pierce iron. The best method of obtaining good specimens of the shells is by splitting open the piece of rock, and thus extracting them without injury from the rocky homes where they have lived and died. A curious projection is observable in the interior of a perfect shell, in appearance somewhat resembling a spoon; but what may be the object of this is somewhat perplexing. The tube, which has been mentioned, generally consists of a composite organ composed of two tubes (or as they may be not inappropriately styled siphons), which are placed in close proximity together, resembling in principle a double-barrelled gun. The water which is necessary for their respiration passes through these tubes, drawn from thence over the gills, and is finally expelled from the other tube. Another mollusc, possessing the same boring propensities, and worthy of notice, is the "*Teredo navalis*," commonly known as the ship-worm, somewhat resembling in its external appearance the "*Serpula*"; so much so that Linnaeus in his "System of Nature," placed the *Teredo* between the *Serpula* and *Sabella*. The reason why it bears the appellation of the ship-worm is because it has such a powerful appetite for submerged timber, and more particularly for ship timber. Frequently pieces of oak, the remains of some wreck, have been so completely

devoured by the Teredo, that it is difficult to discover any portion of the wood that is thicker than an ordinary leaf. As in the case of the "Pholas," the only remedy to preserve the timber from their ravages is to have it either protected by closely driven-in broad-headed nails or copper sheathing. The salt water, however, soon causes the nails to rust, and the whole of the timber is now covered with a thick coating of iron rust, which the Teredo appears to have a great dislike to. The common cockle-shell (*Cardium edule*) is an excellent delver, and armed with his natural spade, digs a hole for himself almost as fast as a man could dig with a metal spade. The cockle is not only a digger, but is likewise a jumper, and the same instrument which serves him as a spade to dig a hole in the sand, also serves him as a foot, by means of which he is enabled to make a spring into the air. Yet another burrowing shell, which can be picked up almost any day on any of our sandy beaches, and that is the Razor-shell (*Solen ensis*). This creature burrows even deeper than the cockle, frequently being found at a depth of two feet. Generally, however, it prefers remaining sufficiently near to the surface to permit the tube just to protrude from the sand. The burrow in which the animal lives is almost perpendicular, and in it the *Solen* passes its entire life, sometimes ascending and sometimes descending; for, bear in mind, it possesses none of those locomotive faculties with which its fellow delver, the cockle, is gifted. The activity of its movements compensates in some degree for its range of travel being somewhat circumscribed, and its habitation likewise so narrow.

GOSFORTH GROVE, near Newcastle-on-Tyne,
November 18th, 1874.

Simultaneous occurrence of Five sinistral examples of *Helix aspersa*.—When I was quite a small boy I was told to look out for a snail that turned the wrong way, meaning a sinistral form of *Helix aspersa*. For forty years or upwards I never killed a snail of any kind without carefully examining it first, and was never successful. But in the year 1865, a labourer working in Moss's nursery gardens here (Epsom) found two examples, evidently of that year's growth, that is, they were about the size of large peas. I reared them to maturity under a glass shade. The following summer I found an adult example feeding on a cauliflower in the garden of my friend, the late Joseph Ward, Esq., and a fourth example I received from Little Bookham, a village about eight miles from this place; and the following winter one was sent to me, an empty, dead shell, but quite in fresh condition, found in an hedge near Uppingham, Rutland. Here we have five examples of a rather abnormal form, all occurring in the same year and in different localities. Many people would no doubt say they were found owing to extra diligence in search; nor did it occur to me to look for any other cause, until this summer my attention was attracted to an analogous case in the vege-

table kingdom. In the succulent house, at Kew I noticed a form of *Haworthia tenuipala*, marked as var. *asperica*. It was a solitary specimen. In the course of a few days I met with a single specimen in two private gardens; here I was able to trace with some degree of certainty whence they came. I entertain no doubt that they were portions of a batch of seedlings raised in one of the most eminent private gardens in the country. I returned to my own garden much dissatisfied that I was unable to procure a specimen, when, upon examining a lot of seedlings raised from seed of my own saving, I discovered what I considered an identical plant. Now, what I wish to call the attention of your readers to is the fact of the simultaneous appearance of these forms in different localities, and to ask if any of them can give a satisfactory theory for these occurrences. No doubt many of your correspondents are interested in other branches of Natural History, and have noticed similar cases, and well considered the subject. The only idea I can form is that it must be due to atmospherical or electrical effects.—JOHN E. DANIEL, 6, The Terrace, Epsom, December 28th, 1874.

Limnaea glutinosa Müller.—At Sandwich, during last autumn, I found this species in a ditch near Sandwich, in tolerable plenty. The peculiarity about it was, that it was rather smaller in size and of a darker colour than usual. Several of my conchological friends have told me that their experience has been that they float at or very near to the surface of the water. In this instance the water was of considerable depth, and they were at the bottom, I suppose crawling on the mud, so that it entailed the necessity of a species of dredging to procure them. Perhaps if this shows their usual habits it may account for the rarity of their occurrence.—[MRS.] J. FITZGERALD, Folkestone, Dec. 15th, 1874.

NOTES ON THE GENUS CYLINDRELLA (PFEIFFER).

By C. P. GLOYNE.

The generic division now known under this name was originally founded in 1828 by the Rev. L. Guilding (a naturalist of great attainments, and to whom we owe some of the first light thrown on the hitherto neglected subject of West Indian Conchology) under the name of *Brachypus*. Guilding seems, however, to have been unfortunate in the choice of names, as both *Brachypus* and *Siphonostoma*, to which he changed the name in 1840, had been previously used in zoology, and Pfeiffer's name, *Cylindrella*, also dating from 1840, must therefore be employed.

The species considered as typical by Guilding was the u. *costata* (*Brachypus*), Guilding, from Barbadoes, an elongated many-whorled shell, with an entire, nearly circular aperture, and truncated at the apex, and the genus as defined by Pfeiffer was distinguished from *Pupa* by the peristome being continuous and detached, or nearly so, and from *Clausilia*, which some of the species somewhat resemble in shape, by the absence of the clau-

silium. In his first edition (*Mon. Heliceorum II.*, pp. 368—386), published in 1848, Pfeiffer enumerates 50 species, chiefly from Cuba and Jamaica, with a few from the other West India Islands and from Mexico and Texas.

To the genus so constituted species continued to be added from time to time, but the geographical area in which the genus was known was scarcely, if at all extended. The majority of the new species were found by Adams and Chitty in Jamaica, and Gundlach in Cuba. The numbers increased so much that in 1868 223 species were catalogued.

In the meantime various subgeneric divisions were proposed, some of them destined to stand either as genera or subgenera, but others merely artificial; but it was not till the animals, as well as the shells, had been studied, that any certain basis was obtained for alterations in the genus.

The anatomy of *Cylindrella* has been studied chiefly by Messrs. Bland, Crosse, and Fischer, and the result has been briefly this:—

1. All the large Mexican species of the type of *C. grandis* (Pfeiffer) have parallel rows of teeth of the usual type in *Helicidae*, and a solid horny jaw, with some fine striae. These form the genus *Euvolutum* (Crosse and Fischer), and are true *Helicidae*. The species are confined to Mexico and Guatemala.

2. The rather small thick species, not truncated at the apex, and of a cretaceous aspect, such as *C. Pileocrea* (Pfeiffer) have also horizontal rows of teeth, and the jaw is thin and not striated. These are also true *Helicidae*, and for them v. Martens subgenus *Holospira* has been raised into a genus, after the exclusion of certain species, such as *Apistoma*, which are true *Cylindrellae*.

3. The anomalous shell from Lower California, first described as *Claudia Taylori*, and afterwards called a *Cylindrella*, has been shown to have horizontal rows of teeth, and a ribbed jaw. It forms at present the only known species of the genus *Berendtsia* Crosse and Fischer).

4. The remaining species are all distinguished by teeth of a peculiar palmate form, arranged obliquely on each side of the median line, and by a very thin jaw with numerous transverse ribs, of which the two median ones enclose a V shaped space. The same characters are found in *Macrocoramus*, a genus conchologically also very similar to *Cylindrella*. Messrs. Crosse and Fischer have therefore formed out of these genera the family *Cylindrellidae*.

They also express an opinion that there will be reason to separate as a distinct genus the section *Lia* (Albers). In this I quite concur. The species of *Lia* are distinguished from the rest of the *Cylindrellidae*, not only by their smooth polished surface, but by their purely arboreal habit. *L. Mangeri* (Wood), the commonest and best known species, is exceedingly abundant in Jamaica on pimento trees.

Another section will also, I think, have to be raised into a genus—*Casta* (Albers). This consists of three Jamaica species—

argusiana (Adams), *elongata* (Chem.), and *gracilis* (Wood), which differ from the rest of the genus by their sinistral volution, pure white colour, and more particularly by being viviparous. They all have similar habits, being found sticking, like so many spikes, on rocks and stone walls, on the lichens clothing which they feed. I have personally ascertained both their viviparity and the nature of their food.

The genus *Lia*, it should be mentioned, contains ten species — eight from Jamaica and two from Haiti.

The genus *Cylindrella*, after the separation of all these new genera, still remains very rich in species, numbering nearly 200. Its distribution become still more largely West Indian. To this, however, there is one curious exception, *Cyl. Cumingiana* (Pfeiffer), from the Philippines. As this species, however, is only known by its shell, and even that differs from the rest of the genus in being umbilicated, it is doubtful whether it really belongs to *Cylindrella*. The most remarkable forms in the restricted genus are:—

1. The *rosea* group. These are thick pupiform shells, of large size for the genus, and varying in colour from light pink to dark purple. The peristome is often more or less attached to the last whorl. In external characters they are *Eucalodina* in miniature. They are chiefly Jamaican.

2. The *Brooksiana* group. These are remarkable for the inordinately long detached tube into which the last whorl is prolonged. The extreme is found in *C. Brooksiana* (Gundlach), in which the tube is more than half the length of the rest of the shell, but the character exists in more moderate proportions in *C. angustior* (Wright) and others. All these species are from Cuba.

3. *C. Elliotti* (Poey), from Cuba, is covered with hollow spines or tubes, in a manner that reminds one of *Choanopoma echinus* and *hystrix* from the same island.

This is one of the most peculiar of all known land-shells, and good specimens, with the white spines brought into relief by the chocolate ground-colour of the shell, are wonderfully beautiful.

One peculiarity of the genus, to which there are but few exceptions, is the decollation of the spire. As the mollusk attains maturity, the animal deserts the upper whorls of the shell, and these almost invariably get broken off, and it is therefore necessary when describing a *Cylindrella* to state whether the number of whorls is that of an entire shell, or after decollation. This peculiarity is shared by *Casta*, *Lia*, and *Eucalodium*.

Several species of *Cylindrella* have peculiar revolving lamellæ on the columella.

The true *Cylindrella* are not arboreal. Many of them, especially of the *rosea* group, are chiefly found on the ground amongst dead leaves, &c.; whilst others, as for instance, *C. semi-nudus* (Adams) from Jamaica, and *C. Trinitaria* (Pfeiffer) from Trinidad, are similar in their habits to *Casta*, and love to decorate rocks and walls with their projecting points.

I would mention in conclusion the genus *Cælocentrum*, lately proposed by Messrs. Crosse, and Fischer. With all due respect to the opinion of those distinguished naturalists, I consider that similar as the species are to *Eucalodium* in every other respect, the hollow axis is not of itself a sufficient character to warrant a generic separation.

Those who desire further information respecting this interesting genus and its allies, are referred to Crosse and Fischer's paper in the *Journal de Conchyliologie* for 1870, to the same author's "Etudes sur les Mollusques terrestres et fluviatiles du Mexique," now in course of publication, to various important papers by Mr. Bland in American publications, and as for all other genera of *Helicidae*, to Dr. Pfeiffer's great work, "Monographia Helicorum."

A LIST OF THE LAND AND FRESHWATER SHELLS FOUND IN THE NEIGHBOURHOOD OF BANBURY, OXFORDSHIRE.

By D. PIDGEON.

The localities from which the following shells were procured lie, for the most part, within a radius of three miles of the town of Banbury, in Oxfordshire, the exceptions being Edgehill, about seven miles, and Charlbury, about sixteen miles distant. At the former place (famous as the site of the battle of Edgehill) there is much wood, harbouring many species of *Helix*, while the latter locality is notable for the abundance, within somewhat narrow local limits, of *Helix pomatia*. Geologically, the district comprises the Lower, Middle, and Upper Lias, the Northampton Sand, and the inferior and great Oolite. The freshwater species are obtained chiefly from the river Cherwell, a small and sluggish stream which cuts, within the district examined, the Lias formation only, and a section of the Oxford and Birmingham Canal.

Although it has now been conclusively shown that the supposed connection between Roman remains and the occurrence of *Helix pomatia* is purely fanciful, it is worthy of remark that a fine example of the Roman Villa stands at a short distance from the spot near Charlbury, where this snail abounds.

Sphærium corneum—River Cherwell, abundant.

Sphærium rivicola—River Cherwell, abundant and fine.

Sphærium lacustre—River Cherwell, less abundant.

Pisidium amnicum—River Cherwell, abundant.

Pisidium fontinale—River Cherwell, abundant.

Unio tumidus—River Cherwell.

Unio pictorum—River Cherwell.

Anodonta cygnea—River Cherwell, and Oxford Canal.

Anodonta anatina—River Cherwell, and Oxford Canal.

Dreissena polymorpha—Oxford Canal, lining the banks in myriads, and forming the frequent food of the water-rats, who leave the empty shells in heaps upon the canal banks.

- Neritina fluviatilis**—On stones, River Cherwell.
- Paludina vivipara**—River Cherwell and Oxford Canal.
- Bythinia tentaculata**—River Cherwell and Oxford Canal, abundant on *Anacharis alsinastrum*.
- Bythinia Leachii**—Oxford Canal, not abundant.
- Valvata piscinalis**—River Cherwell, covering the mud on sunny shallows.
- Valvata cristata**—Ditches running into River Cherwell, in the axils of water weeds.
- Planorbis nitidus**—River Cherwell, very scarce.
- Planorbis albus**—River Cherwell, on *Anacharis* and under-side of Lily leaves.
- Planorbis spirorbis**—Oxford Canal, scarce.
- Planorbis vortex**—River Cherwell and Oxford Canal, abundant on weeds.
- Planorbis carinatus**—River Cherwell and Oxford Canal, preferring large ditches to the river.
- Planorbis complanatus**—River Cherwell and Oxford Canal, preferring large ditches to the river.
- Planorbis corneus**—River Cherwell and Oxford Canal.
- Planorbis contortus**—Ditches running into River Cherwell, in the axils of weeds.
- Physa hypnorum**—River Cherwell, very scarce, among rejectamenta.
- Physa fontinalis**—River Cherwell, very abundant on *Anacharis*.
- Limnæa peregra**—Abundant everywhere; several varieties occur.
- Limnæa auricularia**—R. Cherwell, very fine and abundant.
- Limnæa stagnalis**—R. Cherwell, very fine and abundant.
- Limnæa palustris**—River Cherwell, preferring the oozy shores to the river.
- Limnæa truncatula**—River Cherwell, covering the shores, in myriads.
- Ancylus fluviatilis**—River Cherwell, but always on stones.
- Ancylus lacustris**—River Cherwell, stems and leaves of water plants, lily leaves, especially in company with *P. albus*.
- Succinea putris**—R. Cherwell and Canal, abundant, small.
- Vitrina pellucida**—Edgehill, Draper's Road, Broughton Road, under dead leaves.
- Zonites cellarius**—Common everywhere, but not large.
- Zonites alliarius**—Edgehill, and general.
- Zonites nitidulus**—Not uncommon everywhere.
- Zonites purus**—Edgehill, scarce.
- Zonites crystallinus**—Edgehill, abundant among dead leaves.
- Zonites fulvus**—Edgehill, abundant among dead leaves.
- Helix aculeata**—Edgehill, among dead leaves; very scarce.
- Helix pomatia**—Charlbury, on the grassy banks of the railway cutting.

Helix pomatia var. *albida*--Charlbury, on the grassy banks of the railway cutting. The strata here are entirely Oolitic.

Helix aspersa--Everywhere abundant.

Helix nemoralis--Everywhere abundant.

Helix arbustorum--Cropredy Canal bank, abundant close to the canal bridge, but exceedingly local, giving place to *H. nemoralis* within the space of 100 yards. Its presence may possibly be determined by an abundant growth of *Angelica sylvestris* at this spot, on which it is found.

Helix arbustorum var. *flavescens*, and *Helix arbustorum* var. *alpestris*--Both occur in same place.

Helix Cantiana--Charlbury, on Great Oolite.

Helix rufescens--Common everywhere; very fond of violet leaves.

Helix concinna--Among nettles, canal banks.

Helix hispida--Everywhere, especially the canal banks.

Helix virgata--Canal banks, first lock; the soil here is heavy Lias clay. This shell becomes abundant as soon as the brash soils and the Oolite is approached.

Helix caperata--Very scarce in a Middle Lias or Marlstone quarry. I have only taken two or three specimens in all.

Helix ericetorum--Canal bank, first lock (as *virgata*). This shell occurs only sparingly here, and I have never seen it elsewhere on the clay soils.

Helix rotundata--Edgehill, abundant under stones.

Helix rupestris--Edgehill, on old walls.

Helix pygmaea--Edgehill, not uncommon, when properly searched for; on dead leaves when they have accumulated so as to be nearly knee deep.

Helix pulchella--Edgehill, canal banks; scarce.

Bulimus obscurus--Edgehill, under stones, and sometimes crowding in a young state the bark of the beech trees.

Pupa umbilicata--Edgehill, in old walls.

Pupa marginata--Edgehill,

Vertigo edentula--A single specimen, Edgehill.

Balla perversa--Edgehill, not uncommon in an old wall, but very local; rarely on trees.

Clausilia rugosa--Edgehill, Newbottle, on beech trees and in old walls.

Cochlicopa lubrica--Not uncommon in the rejectamenta of the Cherwell, dead; living, but scarce, Edgehill.

Cochlicopa tridens--Though occurring abundantly at Knowle, in Warwickshire, about thirty miles distant, is not found here.

Achatina acicula--In a marble-one quarry, Oxford Road.

Garychium minimum--Very abundant in the same locality, and associates with *H. pygmaea*, *Z. sulcatus*, and *Z. crystallinus*; Edgehill.

It will be noticed that the slugs are omitted from the above list. Many occur, but they have never been noted by me. It would be presumptuous on my part to suggest that the above list

exhausts the district, but I may be permitted to remark that of the following shells the greater part appear to be undoubtedly absent. In this list I do not of course include shells having special localities, as *H. obvoluta*, *H. Pisana*, *L. involuta*, *U. margaritifer*, &c., &c.

<i>Paludina cincta.</i>	<i>Helix fusca.</i>
<i>Planorbis lineatus.</i>	<i>Helix lapicida.</i>
<i>Limnæa glutinosa.</i>	<i>Bulimus montanus.</i>
<i>Limnæa glabra.</i>	<i>Pupa secale.</i>
<i>Zonites radiatulus.</i>	<i>Clausilia laminata.</i>
<i>Zonites nitidus.</i>	<i>Clausilia bispinata.</i>
<i>Zonites excavatus.</i>	<i>Acme lineata.</i>
<i>Helix cartusiana.</i>	

PAINGTON, DEVON, January 8th, 1875.

MOLLUSCA OF BIRMINGHAM AND NEIGHBOURHOOD.

By G. SHERRIFF TYE.

There are 310 species and varieties of Mollusks described as inhabiting Great Britain :—

46 species	91 varieties	Fluviatile.
78 ",	95 ",	Terrestrial.
Total, 124	186	

There are included in the following list 151 species and varieties, viz :—

38 species	45 varieties	Fluviatile.
44 ",	24 ",	Terrestrial.
Total, 82	69	

Thus it will be seen we have nearly 50 per cent. of the whole number. Taking into consideration the species inhabiting exclusively maritime situations, and such as are restricted to one known locality, varieties dependent upon peculiar situations and others which are the result of accident, we shall find that our district (which includes a portion of the counties of Warwick, Stafford, and Worcester,) offers a good "hunting ground" to the collector.

All the species enumerated are—with the exception of *Helix virgata*,* *H. cantiana*, and *Balea perversa*—confined within a circle of ten miles radius, taking Birmingham for its centre. These species have not hitherto been met with within this boundary, and we have thought it best to include them, as the outlying district is being "worked," and we know not where else their existence will be recorded. In any future tabulation of the "localities" of the Mollusca inhabiting this country (which if fortune favours this journal, we hope its able editors will some day make) it will be for them to eliminate or add to as they think best.

* *Helix virgata*. One dead shell was found in a sandstone quarry at Selly-Oak, although any other evidence of its ever having existed there cannot be found.

Many species once flourishing within the above limits are fast dying out, succumbing to the murky atmosphere and altered ground of the "Black Country," and will have to be looked for "farther afield." Among these may be mentioned *Helix ericetorum** and *H. caperata*, once abounding at Dudley and in the neighbourhood as evidenced by their dead shells. *Helix aspersa*, *H. nemoralis*, *H. arbustum*, *Claustria laminata*, and *Bulimus obscurus*, once common in the same locality, show signs of a rapidly approaching end.

Singular to relate, this section of the district, while made so destructive to land mollusks, has become eminently suitable for aquatic species. Where, in days gone by, little water existed now literally swarms with ponds and dykes, formed by the water pumped from "pits," in which flourish the *Limneidae*, *Unionidae*, and *Sphaeriidae*, in many cases enjoying an immunity from frost,† and so having a better chance of existence than others in less favoured localities.

Dr. J. Gwyn Jeffreys, whose extensive knowledge enables him to speak with authority on the subject, says:—"In local lists of Mollusca, and even in more elaborate works on this subject, it has been the custom to state that the habitat of certain species is restricted to 'calcareous soils,' 'oolitic formations,' 'limestone,' 'chalk,' 'trap,' and other strata. I believe, however, that mineralogical conditions have very little to do with the habitat of any of the Mollusca, nor with their comparative abundance or scarcity in any locality, except so far as food, moisture, or shelter, as well as the secretion of their shells is concerned."

Although quite agreeing with these remarks, we may be allowed to add that a collector will have a greater chance of finding such species as *Helix lapicida*, *H. ericetorum*, *H. virgata*, *Cyclostoma elegans*, and others in a limestone district than in a locality where it does not exist (except near the sea, where mollusks appear to exist upon any kind of soil), although of course it does not necessarily follow that he will not find them in other formations; indeed, examples are by no means uncommon in our district proving such to be the case.

The district round Birmingham lies chiefly upon the sandstones, with large tracts of limestone and Lias, and is alike favourable to the existence of land and fluviatile species.

Mr. Garner † includes in his list of the Mollusca *Helix lapicida*, *H. lamellata*, *Zonites excavatus*, *Succinea oblonga*, *Clausilia biplicata*, *C. rugosa* var. *dubia*, *Limnea glutinosa*, and *Valvata cristata*. Although the existence of some of these is doubtful, I feel

* *Helix ericetorum* is mentioned as being common by Mr. Garner in 1844, and not so rare as *H. virgata* in the county of Stafford. *H. virgata* is common on the limestone formations of Warwickshire, while *H. ericetorum* has occurred but rarely.

+ Gold Fish used to breed in the "Black Country," in pools where the water is kept from freezing by warm water from the coal veins constantly running in. I believe they breed now in the North of England under similar circumstances.

‡ Nat. Hist. of the County of Stafford, by R. Garner, F.L.S., London, 1844

sure that others of them will yet be added to our list, and it will be interesting to know that they still exist in the Midland Counties.

I may add, in conclusion, that one variety, *Planorbis glaber* var. *compressa*, described by Mr. R. M. Lloyd in the first number of this Journal (p. 7), is not included in the list, the locality from whence it came not being known. It was bred in an aquarium to which it was brought on weed in its ovoid or very young state.

It will only be doing bare justice to Mr. Nelson to say that during his residence in Birmingham, extending over a period of nine years, he worked actively and perseveringly in collecting the Mollusca of Birmingham, and to him is due the addition of many species and varieties which, but for his love of the science of Conchology, would have been unrecorded to this day.

HANDSWORTH,

January 1875.

<i>Sphaerium corneum</i>	...	Common everywhere
var. 1. <i>flavescens</i>	...	Plant's Brook, Minworth
3. <i>Scaldiana</i>	...	Canal, Acock's Green
,, <i>rivicola</i>	...	Canals, Acock's Green ; Newton Road ; Wood Green, near Wednesbury
,, <i>ovale</i>	...	Canals, Acock's Green ; Newton Road
,, <i>lacustre</i>	...	Hall Green ; Stechford ; Perry Barr
<i>Pisidium amnicum</i>	...	Sutton Park ; Canal, Acock's Green ; Plant's Brook
,, <i>fontinale</i>	...	
var. 1. <i>Henslowana</i>	...	Hall Green
,, 2. <i>pulchella</i>	...	Stony Lane, Moseley
,, 4. <i>cinercea</i>	...	Ditch, Smallheath, Pond, near Stechford
,, <i>pusillum</i>	...	Perry Barr ; Alum Rock ; Stony Lane
var. 1. <i>obtusalis</i>	...	Pool, Plant's Brook, near Minworth
,, <i>nitidum</i>	...	Ditch, Sparkhill
<i>Unio tumidus</i>	...	Birmingham and Warwick Canal ; Pool, Plant's Brook ; Coleshill
var. 1. <i>radiata</i>	...	Aston ; Plant's Brook ; R. Blythe, Coleshill
,, <i>pictorum</i>	...	Plant's Brook ; R. Blythe, Coleshill ; Dog Pool, Pershore Road ; Kingswood
var. 3. <i>latior</i>	...	Pool, "Penns," near Sutton Coldfield
<i>Anodonta cygnea</i>	...	Plant's Brook ; Pool, Sutton ; Canals, Bourne Brook, &c., &c.
var. 1. <i>radiata</i>	...	R. Tame, Aston ; Penns, near Sutton
,, 2. <i>incrassata</i>	...	Plant's Brook, near Minworth
,, 3. <i>Zellensis</i>	...	Pool, Sandwell Park
,, 4. <i>pallida</i>	...	Sandwell Park
,, <i>anatina</i>	...	Dog Pool, Pershore Road ; Penn's ; Plant's Brook ; Sutton Park
var. 1. <i>radiata</i>	...	Lodge Pool, near Sutton Coldfield ; Barr Park ; R. Blythe, Coleshill
,, 2. <i>ventricosa</i>	...	R. Tame, Aston ; Lodge Pool

<i>Dreissena polymorpha</i>	..	Canals, Smethwick and Bourne Brook ; Pool, Bescot ; R. Tame, Aston, &c.
<i>Neritina fluviatilis</i>	..	River Tame, Aston
<i>Paludina vivipara</i>	..	Canals, Bourne Brook ; Acock's Green ; Smethwick, Kingswood
var. 1. <i>unicolor</i>	..	Kingswood
<i>Bythinia tentaculata</i>	..	Common everywhere
var. 1. <i>ventricosa</i>	..	Alum Rock, Saltley
,, 2. <i>decollata</i>	..	Sutton Park ; Witton ; Smallheath ; Maxtoke
,, 3. <i>excavata</i>	..	Alum Rock, Saltley
,, 5. <i>albida</i>	..	Alum Rock, Saltley
,, <i>Leachii</i>	..	Plant's Brook, Minworth
<i>Valvata piscinalis</i>	..	Stechford ; Bourne Brook ; Knowle ; Aston ; Sutton, &c.
var. 1. <i>depressa</i>	..	Plant's Brook
<i>Planorbis nitidus</i>	..	Smallheath ; Hall Green ; Alum Rock, &c.
,, <i>nautileus</i>	..	Hall Green ; Elmdon ; near Acock's Green
var. 1. <i>cristata</i>	..	Hall Green, &c.
,, <i>albus</i>	..	Common
var. 1. <i>Draparnaldi</i>	..	Smallheath ; Stechford
,, <i>glaber</i>	..	Sutton ; Hagley Road ; Witton
,, <i>spirorbis</i>	..	Near Stechford ; near Elmdon ; King's Heath, &c., &c.
,, <i>vortex</i>	..	Common everywhere
var. 1. <i>compressa</i>	..	Smallheath
,, <i>carinatus</i>	..	Common and distributed
var. 1. <i>disciformis</i>	..	Titterford ; Sutton Coldfield
,, <i>complanatus</i>	..	Moderately common everywhere
,, <i>cornutus</i>	..	Castle Bromwich ; Forge Mills ; Bescot ; Stony Lane ; Albion
,, <i>contortus</i>	..	Stechford ; Coleshill ; Treeford ; Ham- stead
<i>Physa hypnorum</i>	..	Sparkhill ; Alum Rock ; Stony Lane ; King's Heath, &c.
,, <i>fontinalis</i>	..	Bourne Brook ; Stechford ; Aston, &c.
var. 1. <i>inflata</i>	..	Acock's Green ; Sutton ; Forge Mills
,, 3. <i>oblonga</i>	..	Handsworth
<i>Limnaea peregra</i>	..	Sparkhill
var. 4. <i>ovata</i>	..	Sutton Park ; Solihull, &c., &c.
,, 5. <i>acuminata</i>	..	Perry Barr
,, 6. <i>intermedia</i>	..	Common
,, 7. <i>oblonga</i>	..	Marsh, Hamstead
,, 8. <i>labiosa</i>	..	Sutton Park
,, 12. <i>decollata</i>	..	Sparkhill ; near Broomsgrove, Lickey
,, 14. <i>scalariformis</i>	..	Sutton-Coldfield
,, <i>auricularia</i>	..	Pool, Pershore Road ; Plant's Brook ; River Tame ; Perry Barr ; Sutton ; Pebble Mill Pool, &c.

<i>Limnaea stagnalis</i>	...	Common everywhere
var. 1. <i>fragilis</i>	...	Newton Road, near West Bromwich ; King's Heath
", 3. <i>labiata</i>	...	Smallheath
", <i>palustris</i>	...	Moderately common and distributed
var. 1. <i>corvus</i>	...	Treelford ; Coleshill
", 2. <i>elongata</i>	...	Perry Barr
", 3. <i>tinctoria</i>	...	Sutton Park
", 5. <i>roseo-labiata</i>	...	Acock's Green ; King's Heath
", 6. <i>decollata</i>	...	Pool, near Stratford Road
", <i>truncatula</i>	...	Stechford ; Selly Oak ; Smallheath ; Perry Barr, &c.
var. 1. <i>major</i>	...	Sparkhill ; Greet ; King's Heath
", 2. <i>elegans</i>	...	King's Heath ; Alum Rock
", <i>glabra</i>	...	Ditch, Stratford Road ; Acock's Green
var. 1. <i>elongata</i>	...	Ditch, Stratford Road
<i>Ancylus fluviatilis</i>	...	Common in streams
var. 1. <i>capuloides</i>	...	Stream, near Acock's Green ; R. Cole, Stratford Road
", 3. <i>albida</i>	...	Aston
", <i>Jacustris</i>	...	Acock's Green ; Smallheath ; Aston
var. 1. <i>compressa</i>	...	Near Stechford
", 2. <i>albida</i>	...	Plant's Brook

BIBLIOGRAPHY.

The following articles appear in No. 3 of the "Journal de Conchyliologie," July, 1874.

Pages 284-322 are devoted to Paleontology and Bibliography.

CROSSE, H.—Faune malacologique terrestre et fluviatile de l'ile Rodriguez (terrestrial and fluviatile malacological fauna of the Island of Rodriguez), pp. 221—242.

A complete list of the land and freshwater shells of the island, founded on the researches of M. A. Desmazures, who explored it for three months; and as its extent is but small, probably collected nearly every species. There are 24 species in all, and the following are described as new: *Genospira metableta*, Cr. (Pl. viii. f. 5); *G. Rodriguezensis*, Cr. (Pl. viii. f. 6); *G. Chlorts*, Cr. (Pl. viii. f. 7); *Pupa Desmazuresi*, Cr. (Pl. viii. f. 3); *P. Lienardiana*, Cr. (Pl. viii. f. 4); *Helix Rodriguezensis*, Cr. (Pl. viii. f. 1); *Succinea Nevilli*, Cr. (Pl. viii. f. 2); *Planorbis Rodriguezensis*, Cr. (Pl. viii. f. 8); *Cyclostoma haemastomum*, Anton, var. *Rodriguezensis*, Cr.; *C. Desmazuresi* Cr. (Pl. viii. f. 9); *Omphalotropis tawniata*, Cr. (Pl. viii. f. 12); *O. Littorinula*, Cr. (Pl. viii. f. 10); *O. Hameliana*, Cr. (Pl. viii. f. 11).

MONTEROSATO (The Marquis of).—Recherches Conchyliologiques effectuées au cap Santo Vito en Sicile (Conchological researches at Cape Santo Vito, Sicily), pp. 243—282.

An account of species dredged at a depth of 200 mètres = 110 fathoms near Cape Santo Vito, on the N.W. coast of Sicily.

232 species are enumerated, including *Crenella urenaria*, Martin, MS.; *Montacuta tumidula*, Jeffreys (a recent addition to the Mediterranean fauna); *Saxicava rugosa*, Linné, var. *arctica*, L.;

Circulus Jeffreysi, Mte. R.; *Rissea electa*, n. sp.; *Skenia pellucida*, n. sp.; *Scalaria hispidula*, Mte. R.; *Cioniscus gracilis*, Jeffreys, MS.; *Pyramidelia minuscula*, Mte. R.; *Ostostomia Brugnoni*, Mte. R.; *O. flexuosa*, Jeffreys, MS.; *Eulima curva*, Jeffreys, MS.; *Cerithiopsis horrida*, Jeffreys, MS.; *C. diafema*, Watson, MS.; *C. tigris*, ibid.; *Marginella occulta*, Mte. R.; *Amphispira quadrata*, n. sp.; *Philine striatula* and *Monterosati*, Jeffreys, MS.

CROSSE (H.) and FISCHER (Dr. P.)—Diagnoses Molluscorum republīcae Mexicanæ incolarum—pp. 283, 284.

Diagnoses of *Bulinulus Cuernavacensis* and *Cheanoepoma Sumichrasti*, Cr. and F. These species will doubtless be described and figured in future parts of Messrs. Crosse and Fischer's magnificent work on the Mollusca of Mexico and Guatemala, now in course of publication by the French Government.

The following errata occur in the notice of Nos. 1 and 2 of the "Journal de Conchyliologie" in last Quarterly Journal:—p. 39, line 28, for "Rarasuna," read "Karasuna"; p. 40, line 23, for "Cetopoma," read "Otopoma"; p. 41, line 4, M. CROSSE's name should not have been prefixed, the species are described by HEUDE. "Calédonie" and "Calédonien" should be everywhere substituted for "Calédonie" and "Calédonien."—C.P.G.

The fourth number of the "Journal de Conchyliologie" for 1874 contains the following articles:—

H. CROSSE and E. MARIE.—Catalogue des Cônes de la Nouvelle Calédonie et des îles qui en dépendent (Catalogue of the species of *Conus*, from New Caledonia and the adjacent islands), pp. 333—359.

A catalogue of 84 species with precise localities. The authors remark that only the Philippines are equally rich, and that the poverty of the fauna of Australia is a remarkable contrast to the wealth of New Caledonia in this genus. Most of the species are widely distributed in the Indo-Pacific province: but others, as *C. Crossianus*, Bernardi, *C. Vayssérianus*, Crosse, *C. Coelina*, Cr., *C. Liéardi*, Bernardi and Crosse, are peculiar to the Archipelago.

C. Crossianus, Bernardi, can always be distinguished from *C. marmoratus* Lin., by the very dark brown, distant, transverse streaks of the last whorl; these are always found in the former, and never in the latter species.

The venomous properties of *C. textile* are confirmed. An eye-witness relates that a native bitten by one of these cones suffered a considerable swelling of the bitten hand and corresponding arm, which lasted for some time, and was accompanied by very severe pain.

This article is illustrated by two plates (Pl. xiii. and xiv.) representing the opercula of 23 species of cones.

T. DI MONTEROSATO (The Marquis of).—Recherches Conchyliologiques effectuées au cap Santo Vito, en Sicile—Supplément (Conchological researches at Cape Santo Vito, Sicily—Supplement), pp. 359—364. A supplement to the article in last number, 26 additional species added.

LISCHKE (Dr. C. E.)—Observations sur le *Meroe excavata* Hanley, et les espèces voisines (Observations on *M. excavata* Hanley, and the allied species), pp. 364—366.

M. menstrualis, Menke, and *M. magnifica*, Reeve, are only synonymous of *M. excavata*, Hanley, Sowerby, & Reeve, (nec Roemer,) founded on more fully grown specimens.

M. vaginalis, Menke, is a distinct species, and is from Australia, whereas *M. excavata* is from Japan.

H. CROSSE.—Addition au Catalogue des espèces du genre *Meroe* (addition to the Catalogue of the species of the genus *Meroe*), pp. 367, 368.

A rectification of the catalogue at page 89, in accordance with the previous article.

P. FISCHER (Dr.)—Note sur le *Sepia officinalis*, Linné, de la Méditerranée (Note on the Mediterranean Sepia officinalis, L.), pp. 368, 369.

The above species does not really occur in the Mediterranean, the cephalopod from that sea known under that name being the *S. Filliouxi*. *S. officinalis* is purely an Atlantic species.

A. LAFONT.—Description d'un nouveau genre de Nudibranche des côtes de France (Description of a new genus of Nudibranchs from the coast of France), pp. 369, 370.

The new genus *Drepana* is related to *Thecacera*, *Polycreta*, and especially *Ancula*.

The species described is *D. fusca*, Lafont, found under the spat-collecting tiles of the Arcachon oyster-beds.

H. CROSSE.—Description d'un *Pupina* nouveau d'Australie (Description of a new Australian *Pupina*), pp. 370, 371.

P. Pettardi, Cr., from Cookstown, Endeavour river, N.E. Australia, near *P. Coxi* Morel.

A. MORELET.—Description d'un *Achatina* nouveau du Gabon (Description of a new *Achatina* from the Gaboon), p. 372.

A. Vignoniiana, Morelet.

P. FISCHER (Dr.)—Diagnoses specierum novorum (Diagnoses of new species), pp. 372—374.

Diagnoses of *Trochus (Monodontia) zenus*, *T. (M.) vermiculatus*, and *T. fanuloides*, probably in anticipation of the monograph of the genus in the continuation of Kiéner's Iconographie, which Dr. Fischer has undertaken.

LAMBERT (Rev. F.)—Description d'un *Stomatella* provenant de la Nouvelle Calédonie (Description of a *Stomatella* from New Caledonia), p. 374.

S. granosa Lambert.

GASSIES (Dr. J. B.)—Descriptions d'espèces nouvelles terrestres, et fluvio-lacustres de la Nouvelle Calédonie (Description of new land and freshwater shells from New Caledonia), pp. 375—387.

Succinea calcarea, Gas. I. of Art.

Resembles *S. elongata* Drap.

Helix rufolinella, G., Bourail, near *H. Culicolina*; *H. inculta*, G. Baie du Sud, near *H. Calliope*, Cr.; *Physa incisa*, G., Bourail; *P. deliolum*, G., Ouagap, Bourail, and Bonde; *Melanopsis fasciata*, G., Nékété, belonging to the group of *M. variegata*, Mor.; *M. fragilis*, G., Ouagap, somewhat like *M. Mariei*, Crosse; *M. aurantiaca*, G., Bourail and Nékété, related to *M. Marocana*, Chemin.; *M. elongata*, G., Bourail; *M. Brotiana*, G., near Nouméa.

H. CROSSE.—Descriptions d'espèces de Mollusques inédites, provenant de la Nouvelle Calédonie (Descriptions of unpublished species of Mollusca from New Caledonia), pp. 387—396.

Diplomphalus Mariei, Cr., var. β (Pl. xii. fig. 1); Baie du Sud; *D. Vayssiéi*, Marie (Pl. xii. f. 2). These are two species of a curious group of Helices, which are concave both above and beneath.

Helix Prerostiana, Cr. (Pl. xii. f. 3), Baie du Sud; *H. Corymbus*, Cr. (Pl. xii. f. 4), near Nouméa; *Pupa Paitensis*, Cr. (Pl. xii. f. 5), Paita, the first sinistral Pupa discovered in New Caledonia; *P. Fibreana*, Cr. (Pl. xii. f. 6), near Nouméa, also sinistral; *Toratellina Mariei*, Cr. (Pl. xii. f. 7), Baie du Sud; *Diplommatina Perroquini*, Cr., var. β , Baie du Sud; *D. Montrouzieri*, Cr. (Pl. xii. f. 8), Baie du Sud, near *D. Perroquini*; *Hydrobia Gentilisiana*, Cr. (Pl. xii. f. 9), near Ponébo.

Bibliography, Notes, Index, &c., pp. 396—423. M. Crosse mentions in the Notes that Professor Deshayes has finished the arrangement of the very fine series of the genus *Turbo*, 67 species and 1142 specimens, in the Museum of the Jardin des Plantes; and that a number of Mollusca collected by the late expedition to Tonquin have been received. Amongst these are some *Paludinidae* of most peculiar forms resembling *Natica* and *Ampullaria*, and even *Nematura*.

We cannot close this notice without calling attention to the great zeal displayed by the French Naturalists in the exploration of their colony of New Caledonia, every volume of the Journal containing numerous articles on the subject, the efforts of the resident naturalists, Lambert, Marie, Montrouzier, &c., having been ably seconded by Crosse, Gassies, Souverbie, and others in the mother country, and we would express a hope that, now we have obtained possession of the neighbouring Archipelago of the Fijis, we may endeavour to imitate the excellent example of our neighbours on the other side of the Channel. It will be a dire reproach to us if the mollusca of the British possession should continue to be known only by the researches of the American Gould, and by those of the German Graeffe worked up by the Swiss Mousson.—C. P. G.

THE MOLLUSCA OF COOPER'S HILL.

By EDWARD SIMPSON.

Few things are to me more pleasant than a ramble in the country with genial companions. In my search after Land and Freshwater Mollusca, many such rambles have I had, and many pleasant hours have thus passed away. But the one day with the Snails, that has left the most pleasant impression on my mind, was that I spent with my friends Nelson and Percival at Cooper's Hill, situated about 6 miles S. W. of Cheltenham, on the Cotswold Range. Nelson had given such a glowing account of a previous visit he had made, that we came well provided with boxes. The day was favourable for any expedition, rather than a snail-hunt. We wanted some of those showers, after which these molluscous animals are known to "come creeping out," for though there had been heavy rain on the previous day, yet there had not been by any means sufficient to penetrate the thick wood to which we were going.

The distance from our starting point, Cheltenham, was as I have said, about 6 miles, but it appeared to be considerably shorter in consequence of our commencing our search immediately after getting through the town. *Arion ater* and *Helix aspersa* were the first to be seen, some of the latter being very fine. On the road side *Helix caperata*, and *Helix virgata* were met with in great quantities, together with a few of the pretty variety *ornata* of the former species. This variety differs from the typical form "in being smaller, and having broader and darker bands" (Jeffrey's Conchology, p. 214).

Mr. Jeffreys in his book, speaking of *Helix nemoralis* and its varieties *hortensis* and *hybrida*, says he has "never found any two of these forms living together; and M. Bouchard-Chantereaux and others have made the same remarks" (p. 188).

A little further on in our walk, we came upon great numbers of *Helix nemoralis* in the bottom of the ditch by the road-side, and bearing in mind the above statement, we searched carefully for the variety *hortensis*. This we succeeded in finding: the first we found were several feet from the typical form, but we afterwards found them in close proximity, even crawling on the same twig. Our friend Nelson then stated that this was not the first time he had found them associated, and although I am sure I had done so before, yet not having a note of the locality I determined to let it pass until another opportunity occurred. Some conchologists consider *Helix nemoralis* and *Helix hortensis* to be distinct species, and so they appear to me.

The distinctions between them are quite as marked, or even more so, than between some species upon which all conchologists

are agreed. But I must not let myself be led into a dissertation on the wonderful theme of "species v. varieties," much though I feel inclined. Any one who wants something upon which to exercise his intellectual faculties will find plenty of scope for it, if he goes carefully through Mr. Jeffreys' valuable work. But to return, soon after this discovery we left the road, and passing through some fields, we arrived at the woods which were to occupy us for the remainder of the day.

These woods are formed almost entirely of Beech trees, and are on the slope of the Cotswold range of hills. Just before entering them we took *Pupa seeale* in great abundance, and also *Helix ericetorum*, the specimens of which had a remarkably deep tint. It was near this spot that we first met with the beautifully-sculptured shell, *Cyclostoma elegans*. The *Helix virgata* which are collected on the top of the hill above the woods are much smaller, but more deeply colored than those we had taken below. We now entered the wood, and soon found ourselves quite overwhelmed by the quantities of the molluscs.

From the trunks of the trees, and extending up a considerable height on them, we took *Bulinus montanus* in some abundance, in company with *Bulinus obscurus*, *Clausilia rugosa*, and *Clausilia laminata* together with a few of the variety *albida*, of the last named species. At the foot of the trees we took *Helix lapicida*, but rather sparingly in consequence of the dryness of the season; also *Helix rufescens*, which was very abundant and of large size. Proceeding onward into the heart of the wood under the guidance of Nelson, we came to a dell, the ground in which was thickly covered with decaying leaves. Here we found the prize of the day, *Clausilia Rolphii*. Although very abundant in this spot they seemed to be confined almost entirely to it, and we only succeeded in obtaining a solitary individual here and there in other parts of the wood. Many of them were much eroded, and had more the appearance of "dead shells." In the dell we also took a few *Helix aculeata*; which Mr. Jeffreys describes as being an exquisitely beautiful object, especially when it is fresh and encircled with its coronet of spines" (p. 176). Our next capture was *Helix pomatia*, the edible snail, the presence of which in this country has given rise to much diversity of opinion. The specimens were not particularly fine. (The finest in my possession are from Croydon). This snail is becoming scarce at Cooper's Hill, owing I am told to the gipsies, who have long been aware of its gastronomic qualities. Gloucestershire is, I believe, the most Northern locality yet recorded for this shell. Percival was here so fortunate as to find the somewhat local variety *exalbida* of *Helix aspersa*.

On the moss-covered walls which surround the wood we found the pretty little species *Helix rupestris* and also *Balia perversa*,

the latter species might at first sight be taken for the young of *Clausilia rugosa*, but it may be distinguished from it by its being "thinner, and of a much lighter color, in the whorls being much more convex, and especially in the periphery or basal edge being rounded instead of sharply angular as in the young shell of that species." (Jest. vol. 2, p. 275). In addition to the species already named, we took the following more common ones: *Limax agrestis*, *Limax arborum*, *Vitrina pellucida*, *Zonites cellarius*, *Zonites fulvus*, *Zonites crystallinus*, *Zonites nitidulus*, *Helix rotundata*, *Helix hispida*, *Helix arbustorum*, *Cochlicopa lubrica*, and *Carychium minimum*: to which may be added *Helix virgata* var. *subglobosa*, and *Helix nemoralis* var. *major*. This makes altogether a grand total of 31 species and 6 varieties. Of freshwater shells we did not take any, for the simple reason that we never saw a pond or stream the whole day. It was now getting too dark for any further explorations in the wood, so we made the best of our way back to town, highly gratified with the result of our day's work in the Beechwood on the Cotswold Hills, and mentally resolving to pay it another visit at no distant period.

SPECIES AND VARIETIES OF MOLLUSCA,
FROM COOPER'S HILL, NEAR CHELTENHAM.

Arion ater	<i>Helix virgata</i>
<i>Limax agrestis</i>	" " var. <i>subglobosa</i>
<i>Limax arborum</i>	<i>Helix caperata</i>
<i>Vitrina pellucida</i>	" " var. <i>ornata</i>
<i>Zonites cellarius</i>	<i>Helix ericetorum</i>
<i>Zonites nitidulus</i>	<i>Helix rotundata</i>
<i>Zonites crystallinus</i>	<i>Helix rupestris</i>
<i>Zonites fulvus</i>	<i>Helix lapicida</i>
<i>Helix aculeata</i>	<i>Bulimus montanus</i>
<i>Helix pomatia</i>	<i>Bulimus obscurus</i>
<i>Helix aspersa</i>	<i>Pupa secale</i>
" " var. <i>exalbida</i>	<i>Baia perversa</i>
<i>Helix nemoralis</i>	<i>Clausilia rugosa</i>
" " var. <i>hortensis</i>	<i>Clausilia Ro. phii</i>
" " var. <i>major</i>	<i>Clausilia laminata</i>
<i>Helix arbustorum</i>	" " var. <i>albida</i>
<i>Helix rufescens</i>	<i>Cochlicopa lubrica</i>
<i>Helix hispida</i>	<i>Carychium minimum</i>
	<i>Cyclostoma elegans</i>

Upper Norwood, March 18, 1875.

Helix obvoluta Müller.—Although the Spring is not a good time of the year for shells, I am able to record, I think,

conclusive evidence of a new locality for this shell, which is, I believe, the most easterly point at which it has yet been noticed, I found some specimens, evidently only recently dead, among moss at the roots of trees on a bank at Duneton, a little village about a mile and a half from the Petworth Station of the London, Brighton and South Coast Railway. It is situated about 14 miles from Buriton and Stoner, the original localities in which this shell was found, and in fact the only ones given by Mr. Jeffreys, but is still confined to the same line of hills as those places, and is still on a chalk soil as are the other places in which this shell has been noticed.—THEO. GODLEE, Walthamstow.

MOLLUSCA OF BIRMINGHAM & NEIGHBOURHOOD.

By G. SHERRIFF TVE.

(Continued from page 61).

<i>Arion ater</i>	Common.
„ <i>hortensis</i>	Common in gardens, Hamstead.
<i>Limax gagates</i>	Stratford Road.
„ <i>carinatus</i>	Camp Hill ; Yardley.
„ <i>flavus</i>	Digbeth ; Sparkbrook ; Handsworth.
„ <i>agrestis</i>	Common everywhere.
„ <i>arborum</i>	Yardley ; Harborne, and nr. Knowle.
„ <i>maculatus</i>	Edgbaston ; Erdington ; Sparkbrook ; Dudley ; Handsworth.
<i>Succinea putris</i>	Dog Pool ; Harborne ; Sutton ; Plant's Brook ; Alum Rock.
„ „ <i>var. vitrea</i>	Acock's Green ; Plant's Brook.
„ <i>elegans</i>	Acock's Green.
<i>Vitrina pellucida</i>	Harborne ; Selly Oak ; Plant's Brook ; Dudley ; Hamstead, &c.
<i>Zonites cellarius</i>	Common.
„ „ <i>var. compacta</i>	Steechford ; Dudley Castle.
„ <i>glaber</i>	Near Solihull.
„ <i>alliarius</i>	Moderately common.
„ „ <i>var. viridula</i>	Dudley Castle ; Perry Barr ; Harborne.
„ <i>nitidulus</i>	Common.
„ „ <i>var. nitens</i>	Maxstake.
„ <i>purus</i>	Perry Barr ; Knowle ; Acock's Green ; Hampton-in-Arden.
„ „ <i>var. margaritacea</i>	Selly Oak ; Dudley Castle ; Acock's Green.
„ <i>radiatulus</i>	Perry Barr ; Sparkbrook ; Hamstead ; Great.
„ „ <i>var. viridiscenti-alba</i>	Sparkbrook.
„ <i>nitidus</i>	Witton ; B. & W. Canal ; Selly Oak.
„ <i>crystallinus</i>	Selly Oak ; Dudley ; Acock's Green, &c.
„ <i>fulvus</i>	Selly Oak ; Dudley ; Acock's Green Harborne.

<i>Helix aculeata</i>	Solihull; Knowle; Perry Barr; Acock's Green; Harborne, &c. Generally distributed but not common.
„ <i>aspersa</i>	Common. „ „ „
„ <i>nemoralis</i>	Hamstead; Sparkhill.
„ „ var. <i>hortensis</i>	Dudley Castle; Wren's Nest, Dudley; Stechford.
„ „ <i>hybrida</i>	Dudley Castle Grounds.
„ <i>arbustorum</i>	Henley-in-Arden.
„ „ var. <i>flavescens</i>	Perry Barr.
„ <i>Cantiana</i>	Perry Barr.
„ <i>rufescens</i>	Common and distributed.
„ „ var. <i>albida</i>	Common and distributed.
„ <i>hispida</i>	Acock's Green; Dudley Castle.
„ „ var. <i>subrufa</i>	Amongst Brambles and Ferns, on a grassy bank, near Knowle.
„ „ „ <i>albida</i>	Grafton, near Alcester.
„ <i>fusca</i>	Selly Oak; Solihull; Yardley, &c.
„ <i>virgata</i>	Grafton.
„ <i>caperata</i>	Selly Oak; Yardley.
„ „ <i>major</i>	Grafton, nr. Alcester; Hay Head, nr. Walsall.
„ „ <i>ornata</i>	Common everywhere.
„ <i>ericetorum</i>	Dudley Castle.
„ <i>rotundata</i>	Acock's Green; Dudley Castle; Hamstead.
„ „ var. <i>pyramidalis</i>	Solihull; Knowle; Perry Barr, &c.
„ „ „ <i>alba</i>	Selly Oak; near Harborne; Solihull; Wren's Nest; Perry Barr.
„ <i>pyrenaica</i>	Wren's Nest; Solihull.
„ <i>pulchella</i>	Dudley Castle; Wren's Nest; Solihull.
„ „ var. <i>costata</i>	Stechford; Alcester Road, near the Maypole, near Birmingham.
<i>Bulinus obscurus</i>	Acock's Green.
<i>Pupa umbilicata</i>	Quarry, Selly Oak; Knowle.
„ „ var. <i>edentula</i>	Acock's Green.
<i>Vertigo pygmaea</i>	Selly Oak; Beggars Green; Acock's Green.
„ <i>edentula</i>	Fenny Compton.
„ „ var. <i>columella</i>	Selly Oak; Wren's Nest; Hamstead; Solihull, &c.
<i>Balea perversa</i>	Selly Oak.
<i>Clausilia rugosa</i>	Selly Oak; Hamstead.
„ „ var. <i>albida</i>	Dudley; Wren's Nest; Selly Oak.
„ „ var. <i>Everetti</i>	Dudley; Acock's Green; nr. Harborne.
„ <i>Janninata</i>	Selly Oak; Hamstead; Perry Barr; Dudley Castle.
<i>Cochlicopa tridens</i>	Acock's Green; Dudley, &c., &c.
„ „ var. <i>crystallina</i>	Acock's Green; Dudley.
„ <i>lubrica</i>	Acock's Green.
„ „ var. <i>lubricoides</i>	
„ „ var. <i>ovata</i>	

Achatina acicula	Dudley Castle (one specimen, dead).
Carychium minimum	Selly Oak, Dudley Castle. Solihull. Acock's Green. Harborne. Hamstead

The nomenclature and arrangement adopted in the foregoing List is that of J. Gwyn Jeffreys, LL.D., F.R.S., F.G.S., &c.

58, Villa Road, Handsworth.

A VARIETY CAUSED BY LOCALITY.

(*Unio pictorum* var. *compressa*.)

In Jeffreys' "Manual of Land and Freshwater Shells" will be found a named variety (*compressa*) of *Unio pictorum*. When my father first found this singular form, he was of opinion it might be caused by circumstances, and those circumstances were a peculiar rush of the current; and I thought if it were so, they ought to be found at another locality six or seven miles from the place where they were first met with, though on the same river, and sure enough they were there.

I will now describe the place, hoping that some of your readers may find the same variety in similar situations. It is in places where the river winds so sharply that they are called here "horse shoe reaches," the current rushes rather strongly at the last bend to the other side of the stream and forms an eddy next the bank on the outside of the bend, and these shells are found just inside and at the edge of the sharp current next to the eddy. The extreme abnormal form is very singular, nearly as broad as an *Anodonta*, caused no doubt by the current washing away the softer particles of mud, and the shell having harder work to keep itself partially buried in the bottom causes the unusual expansion.

JOHN B. BRIDGMAN, Norwich.

Helix caperata var. *ornata* *Picard*.—I have much pleasure in noticing an entirely new locality for this pretty variety, the ones Mr. Jeffreys gives being North and South Wales, South Devon and Cork. I however found several specimens on the summit of Amberley Down, in Sussex, at a considerable elevation. The lower part of the Down on the north side, by which I ascended was well supplied with *Helix Cartusiana* and *Helix ericetorum*, but *Helix caperata* was hardly to be found, and the var. *ornata* appeared to be confined to the very top. The soil is chalk.—THEO. GODLEE, Walthamstow.

SHELLS OF CEYLON.

By A. W. LANGDON.

The following list of the Marine Gastropoda of Ceylon has been compiled in a great measure from parcels received from a correspondent in that Island, during the years 1867-70. They were, with few exceptions, procured from the Moors (Arabs) at Trincomale by a gentleman long resident there, who writes, "They are exclusively, so I am assured, shells found on the N.E. Coast of Ceylon, at Trincomale, and a little to the N. and S. of it." For the names of a great many I am indebted to the kindness and learning of my friend, Mr. Geo. B. Sowerby, Junr., of Great Russell Street.

My purpose in offering this list to the readers of the Quarterly Journal of Conchology, is to supply an authenticated habitat for species that every Collector is sure to number amongst his earliest acquisitions, and also to lead the way for similar lists from other localities, and thus help to extend our knowledge of the distribution of the mollusca.

The list, as will be seen on inspection, is very imperfect, principally from the omission of small or unattractive species, such as would not engage the attention of unscientific collectors.

<i>Murex adustus</i> Lam.	<i>Pleurotoma cingulifera</i> Lam.
<i>M. anguliferus</i> Lam.	<i>P. marmorata</i> Lam.
<i>M. Cumingi</i> A. Ad.	<i>P. nodifera</i> Lam.
<i>M. haustellum</i> L.	<i>P. tigrina</i> Lam.
Not so large as specimens from Singapore.	
<i>M. inflatus</i> Kiener.	<i>Triton aquatalis</i> Reeve.
<i>M. palma-rosæ</i> L.	<i>T. chlorostoma</i> Lam.
<i>M. secundus</i> Lam.	<i>T. cingulatus</i> Pfr.
<i>M. tenuispina</i> Lam.	<i>T. clandestinus</i> Chem.
Very common, and often in fine condition.	<i>T. gemmatus</i> Reeve.
<i>Fusus colus</i> L.	<i>T. grandimaculatus</i> Reeve.
<i>F. laticostatus</i> Desh.	Very distinct from <i>T. lotorum</i> , which is often mistaken for it.
<i>F. tuberculatus</i> Lam.	<i>T. lampas</i> L.
<i>Pisania flammulata</i> Quoy.	<i>T. lotorum</i> L.
= <i>picta</i> Reeve.	<i>T. pilearis</i> L.
<i>P. tritonoides</i> Reeve.	<i>T. retusus</i> L.
<i>Cantharus melanostoma</i> Sow.	<i>T. rubecula</i> L.
<i>C. Tranquebaricus</i> Martini.	<i>T. Strangii</i> Ad. & Quoy.
<i>C. rubiginosus</i> Reeve. subgenus <i>Tritonidea</i> Swains.	<i>T. tripus</i> Lam.
<i>C. undosus</i> L. subgenus <i>Tritonidea</i> Swains.	<i>T. tuberosus</i> Lam.
<i>Pyrula bucephala</i> Lam.	<i>T. variegatus</i> Lam.
<i>P. vespertilio</i> Lam. = <i>pugilina</i> Born.	<i>Persona anus</i> Lam.
	<i>P. clathrata</i> Lam.
	<i>Ranella affinis</i> Brod.
	This sp. appears to be identical with <i>R. granifera</i> Lam.

- Ranella albivaricosa Reeve.
 R. bitubercularis Lam.
 R. busonia Gm.
 R. crumena Lam.
 R. margaritula Desh.
 R. gyrina L.
 Bullia vittata L.
 Phos Blainvillei Desh.
 Nassa arcularia L.
 N. canaliculata Lam.
 N. densigranata Reeve.
 N. elegans Kiener.
 N. fasciata Quoy & Gaim.
 N. Jacksoniana Quoy & Gaim.
 N. monile Kiener.
 N. olivacea
 N. papillosa L.
 N. suturalis Lam.
 N. Thersites Brug.
 Eburna Ceylonica Brug.
 E. spirata L.
 Purpura bufo Lam.
 P. hippocastanum L.
 P. mancinella Lam.
 P. Persica Lam.
 P. sertum Brug.
 subgenus *Iopas* H. & A. Ad.
 Ricinula arachnoides Lam.
 R. biconica.
 R. concatenata Lam.
 R. horrida Lam.
 R. hystrix Lam.
 R. margariticola Brod.
 R. morus L.
 R. spectrum Reeve.
 R. tuberculata de Blain.
 Cuma carinifera Lam. ?
 Rapana bulbosa Sol.
 Coralliophila madreporarum
 C. suturalis A. Ad. [Sow.
 C. violacea.
 Rapa papyracea Lam.
 Oliva episcopalis Lam.
 Oliva gibbosa Born.
 O. gibbosa v. utriculus Dillw.
 O. inflata Lam.
 O. inflata v. undata Lam.
 O. irrigans Lam.
 O. ispidula L.
 O. maura Lam.
 O. ponderosa Ductos.
 O. textilina Lam.
 O. tremulina Lam.
 Ancillaria candida Lam.
 A. Mauritanica Sow.
 Fasciolaria filamentosa Lam.
 F. trapezium L.
 Tudicla spirillus L.
 Sometimes placed with *Murex*
 and sometimes with *Turbinella*.
 The operculum is more like that
 of *Fasciolaria trapezium*.
 Latirus gibbulus Gm.
 L. polygonus Gm.
 Turbinella pyrum L.
 T. rapa Lam.
 Scolymus corniger Lam.
 Voluta Broderipi Gray.
 subgenus *Melo* Humph.
 V. diadema Lam.
 subgenus *Melo* Humph.
 V. Indica Gm.
 subgenus *Melo* Humph.
 V. lapponica L.
 V. vexillum Chem.
 Mitra aurantia Gm.
 M. cinctella Lam.
 M. clathrata Reeve.
 Rare.
 M. crebrilirata Reeve.
 M. cucumerina Lam.
 M. episcopalis Lam.
 M. fissurata Lam.
 M. glans Reeve.
 M. lacunosa Reeve.
 Rare.
 M. literata Lam.
 M. luctuosa A. Ad.

- Mitra scabriuscula *L.*
 Marginella angustata *Sow.*
 Columbella bidentata *Mee.*
C. flavidula Lam.
C. Tyleri Gray.
- Harpa conoidalis *Lam.*
 Probably a var. of *H. ventricosa*,
 It is the commonest sp. from
 Ceylon.
- H. minor Rumph.*
H. minor v. crassa A. Ad.
H. nobilis Mart.
H. ventricosa Lam.
 Neither so common nor so large
 as at the Mauritius.
- Cassis areola *L.*
C. canaliculata Lam.
C. cornuta L.
C. glauca L.
C. rufa L.
C. torquata Reeve.
 Probably a var. of *C. vibex*.
C. vibex L.
- Doliolum Cumingii *Hanley.*
D. maculatum Lam.
D. olearium L.
D. perdix L.
D. variegatum L.
- Malea pomum *L.*
- Ficula ficus *Lam.*
F. reticulata Lam.
 This genus is usually placed with
 the *Cassidee*, but judging from
 the figures of the animal in
 Mrs. Gray's *Mollusca*, it is
 more nearly allied to *Voluta*.
- Natica ala-papilionis *Chem.*
N. albumen L.
N. areolata Recl.
N. clausa Brod. & Sow.
N. columnaris Recl.
N. Lamarckiana Recl.
N. lineata Chem.
N. mamilla L.
N. melanostoma Gm.
- Natica melanostomoides *Quoy.*
N. pyriformis Recl.
 Probably a var. of *N. mamilla*.
N. Raynaudiana Recl.
N. rufa Born.
N. simiae Recl.
- Sigaretus planulatus *Recl.*
- Terebra cærulescens *Lam.*
T. dimidiata L.
T. duplicata L.
T. maculata L.
T. myuros L.
T. pertusa.
T. subulata L.
- Pyramidella auris-cati *Chem.*
- Obeliscus dolabratus *L.*
O. maculosus Lam.
- Solarium laevigatum *Lam.*
S. perspectivum Lam.
S. perspectiviunculum.
S. pictum Phil.
S. trochoides Desh.
- Conus achatinus *Chem.*
C. amadis L.
 A var. also occurs of more delicate texture.
C. arachnoideus Gm.
C. arenatus Brug.
 Smaller than specimens from the
 Mauritius.
- C. augur Brug.*
C. aulicus L.
C. bandanus Brug.
C. betulinus L.
C. capitaneus L.
C. catus Brug.
 An orange-colored variety.
C. Ceylonensis Brug.
C. eburneus Brug.
C. episcopus Brug.
C. figulinus L.
C. flavidus Lam.
C. geographus L.
 Some specimens were received
 with opercula.
C. glans Brug.

- Conus Hebraeus L.*
C. lithoglyphus Mensch.
C. lividus Brug.
C. Loroisii Kiener.
C. Malaccanus Brug.
 Very rare. Allied to *Conus capitaneus* L.
C. Maldivus Brug.
C. marmoreus L.
C. miles L.
C. miliaris Brug.
C. millepunctatus L.
C. minimus L.
C. monile Brug.
C. nimbosus Brug.
C. Nussatella L.
C. obesus Brug.
C. obscurus Brug.
C. pertusus Brug.
C. ponderosus Bk.
 = *quercinus* v. ?
C. puncticulatus Brug.
C. quercinus Brug.
C. ratus Sol.
C. striatus L.
C. sulphureus
C. Suratensis Brug.
C. terebra Born.
C. terminus Lam.
C. tessellatus Brug.
C. textile L.
C. tulipa L.
C. verniculatus Lam.
C. vexillum Mart.
C. virgo L.
 No examples occurred of the var.
 (or species?) *emaciatus* Reeve.
- Strombus auris-Dianae L.*
S. canarium L.
S. gibberulus L.
S. labiosus Gray.
S. lentiginosus L.
S. marginatus L.
S. Mauritius Lam.
S. mirabilis Sow.
 Allied to *S. vitarus* L., but much
 larger. Only two specimens
 are known.
- Strombus Samar Chem.*
 = *tridentatus* Lam.
S. succinctus L.
 A var. occurs of very pale violet
S. tricornis Lam.
S. ureus L. v.
- Pteroceras aurantia Lam.*
P. chiragra L.
P. lambis L.
P. scorpio L.
- Rostellaria curta Sow.*
 Very rare. The common sp.
R. curvirostris Lam. does not
 occur in parcels of Ceylon
 shells. Its home is the Red
 Sea.
- R. fissurella L.*
 subgenus *Rimella* Agas.
- Terebellum subulatum Lam.*
- Cypraea annulus L.*
C. Arabica L.
C. Argus L.
C. asellus L.
C. caput-serpentis Lam.
C. caurica L.
C. carneola L.
C. clandestina L.
C. cribaria L.
 A var. occurs with spots on the
 base, but distinguishable from
 the allied sp. *C. esontropia*
 Duel., which is not uncommon
 at the Mauritius.
- C. cruentata Gm.*
 A small var. The type is from
 Mauritius.
- C. erosa L.*
C. errones L.
C. felina Gray.
C. fimbriata Gm.
C. globulus L.
 No examples from Ceylon of the
 sp. (or var. ?) *C. circula* L.,
 which is from Borneo and
 Singapore.
- C. helvola L.*
C. interupta Gray.
C. isabella L.

- C. lentiginosa Gray.
 C. lynx L.
 C. macula A. Ad.
 ? A var. of *C. fimbriata* Gm.
 C. Mauritanica L.
 C. moneta L.
 Sometimes with a yellow ring like
C. annulus, but always distin-
 guishable. The animals, ac-
 cording to Mrs. Gray's figures,
 are different.
 C. neglecta Sow.
 C. nucleus L.
 Live shells are very uncommon.
 C. ocellata L.
 C. onyx L. v. adusta Lam.
 C. poraria L.
 C. pulchra Gray.
 C. punctata L.
 C. pyriformis Gray.
 C. reticulata Martyn.
 = histrio L.
 This species is connected with
C. arabica by many interme-
 diate forms.
 C. secura Chem.
 C. staphylea L.
 C. staphylea v. limacina Lam.
 C. stolidia L.
 C. tigre L.
 C. torin. Lam.
 C. undata Lam.
 C. vitellus L.
 C. globosa Gray.
 subgenus *Trivia* Gray.
 Ovulum ovum L.
 O. angulosa Lam.
 O. verrucosa L.
 subgenus *Calvurnus* Mft.
 O. birostris L.
 subgenus *Birostra* Swainson.
 = *Volva* Bolt.
 O. volva L.
 subgenus *Birostra* Swainson.
 = *Volva* Bolt.
 C. ritium attenuatum Phil.
 C. asperum L.
 C. Martinianum Pfr.
- Cerithium morus Lam.
 C. obeliscus Brug.
 C. vertagus L.
 Potamides palustris L.
 P. telescopius L.
 P. fluviatilis Potiez & Michaud.
 Littorina lineata D'Orbt.
 L. Novaë Zealandiae Reeve.
 L. scabra L.
 L. trochoides Gray.
 subgenus *Ticlaetus* Val.
 Planaxis sulcata Lam.
 Turritella bicingulata Lam.
 T. cingulifera Sow.
 T. columnaris Kiener.
 T. duplicata L.
 T. rosca Quoy.
 Siliquaria muricata Lam.
 Phorus corrugatus Reeve.
 Crucibulum extintorium Sow.
 Hipponyx australis L.
 Nerita albicilla L.
 N. costata Gm.
 N. lineata Chem.
 N. plicata L.
 N. polita L.
 Phasianella australis Gm.
 P. australis v. venusta Reeve.
 P. nivosa
 Turbo crenulatus Gm.
 T. radiatus Gm.
 T. spinosus Reeve.
 Pachypoma rhodostoma Lam.
 Rotella guamensis Quoy.
 R. vestiaria L.
 Delphinula distorta L.
 Euchelus tricarinatus Lam.

<i>Trochus pyramis</i> <i>Born.</i>	<i>Dentalium octogonum</i> <i>Desh.</i>
<i>T. tentorium</i> <i>Chem.</i>	<i>Patella plicata</i> <i>Born?</i>
<i>Elenchus bellulus</i> <i>Dkr.</i>	<i>Chiton</i> sp.
<i>E. iriodon</i> <i>Quoy.</i>	<i>Tornatella solidula</i> <i>L.</i>
<i>Haliotis varians</i> <i>L.</i>	<i>Atys naucum</i> <i>L.</i>
<i>Fisurella variegata.</i>	<i>Dolabella gigas</i> <i>Rang.</i>
<i>Emarginula fissurata</i> <i>Chem.</i>	<i>D. Rumphii</i> <i>Cuv.</i>
<i>E. notata</i> <i>L.</i> subgenus <i>Clypidina</i> Gray.	Much smaller than specimens from Mauritius.
<i>Parmaphorus corrugatus</i> <i>Reeve.</i>	<i>Siphonaria atra</i> <i>Quoy.</i>

B I B L I O G R A P H Y.

The following articles appear in the January number of the *Journal de Conchyliologie*, 1875.

CROSSER, H.—Distribution géographique et synonymie des *Bulimes* auriculiformes des îles de l'Archipel Fiji. (Geographical distribution and synonymy of the auriculiform *Bulimi* of the Fijis). pp. 5—21.

The author enumerates 14 species divided into two sections—*Euplacoptylus* Crosser, comprising the species with an obtuse posterior extremity to the animal, and with the peristome thickened similar to the New Caledonian species; and *Churia* Albers, with a round and flattened posterior extremity, and a less thickened peristome, including *B. fulguratus* and *malleatus* of Jay. It is remarkable that whilst the former section are found on the ground the latter are arboreal. The following species are figured:—*B. Kerewensis*, Garrett (Pl. 1, f. 5); *B. Meussoni*, Graefie (f. 6); *B. clobatus*, Gould, v. β (f. 7); *B. Hoyti*, Garrett (f. 8).

MORELET, A.—Appendice à la Conchyliologie de l'île Rodriguez. (Appendix to the Conchology of the Isle of Rodriguez.). pp. 21—30.

Mr. Bewsher in the course of an Ornithological exploration of Rodriguez also collected shells, and added several species to those found by M. Desmazures and enumerated in the previous volume. The following are described as new by Morelet, *Helix Bewsheri* (subfossil amongst bones of the Dodo), (Pl. i. f. 1); *Melampus Dupontianus* (f. 2); *Cyclostoma bipartitum* (subfossil) (f. 3), *C. Bewsheri* (subfossil) (f. 4).

MORELET, A.—Testacea in insulâ Mauritii a Cl. Dupont nuperrimè detecta (Shells recently found at the Mauritius by M. Dupont), pp. 31—32.

Diagnoses of *Helix cycalaria* (subfossil), *H. Boryana*, *Pupa helodes* and *Mülleria* (subfossil), and *Limnaea Mauritia*.

SOUVERBIE AND MONTROUZIER.—Descriptions d'espèces nouvelles de l'Archipel Calédonien (Descriptions of new species from the New Caledonian Archipelago), pp. 33—44.

The following are described:—*Haliotinella* (new genus) Souverbie, is provisionally placed near *Sigaretus*, but it is not known whether the genus is terrestrial or marine. *H. Montrouzieri* Souverbie (Pl. IV, f. 1) I Art. *Stomatella granosa* Lambert (f. 2), I. Lifou (Loyalty Ids). *Trochus (Monilea) rhodomphalus*. Souv. (f. 3), I. Lifou. *T. (Euchelus) Lamberti*, Souv. (f. 4), I. Nou. *T. (Euchelus) fossulatus*, Souv. (f. 5), I. Art. *T. (Zizyphinus) Poupineli*, Mont. (f. 6), I. Art. *T. (Polydonta) calcaratus*, Souv. (f. 7), I. Art. *Amathina angustata*, Souv., I. Art. *Mitra turturina*, Souv., I. Lifou.

FISCHER, P.—Catalogue des Mollusques appartenant aux genres *Turbo*, *Calcar* et *Trochus* recueillis dans les mers de l'Archipel Calédonien (Catalogue of Mollusca of the genera *Turbo*, *Calcar* and *Trochus* collected in the seas of the New Caledonian Archipelago), pp. 44—51.

Thirty one species are enumerated, and it is remarked that whilst some species such as *Turbo petholatus*, *Trochus Niloticus* and *phasianellus* are identical with those of the Indian Ocean the greater number belong to the Australo-Polynesian Fauna, which Dr. Fischer considers as clearly distinct from Woodward's Indo-Pacific Fauna.

CROSSE and FISCHER.—Diagnoses Molluseorum novorum Guatimalæ et reipublicæ Mexicanæ incolarum (Diagnoses of new Guatemalan and Mexican Molluses), pp. 52—53.

Bulimus Sargi and *Botterii*.

FISCHER, Dr. P.—Supplément à la liste des espèces du genre *Vaginula* (Supplement to the list of species of *Vaginula*) pp. 53—57.

V. olivacea Stearns, from Nicaragua and *V. paranensis* Burmeister, from Parana and Santa Fé should be added to the list published in Vol. vii, of the "Nouvelles Archives du Muséum."

CROSSE, H.—Sur les caractères de l'opercule dans le genre *Neritopsis* (On the characters of the operculum in the genus *Neritopsis*), pp. 57—66.

The operculum of *Neritopsis natalis* lately received *in situ* from New Caledonia has explained the nature of certain problematical discoid bodies found in the lias and considered as parts of *Cephalopoda* by Eudes and Eugène Deslongchamps, and as *Brachiopoda* by Quenstedt. M. Crosse points out the analogy between the operculum of *Neritopsis* and that of *Nerita*.

Pp. 66-81 contain paleontological articles, a summary of which will be given by the Recorder in the Record of Geological Literature.

DESHAYES, G. P.—Observations sur les animaux de deux *Naiades* exotiques (Observations on the animals of two exotic *Naiads*), pp. 81-85.

An *Anodon* sent by Dr. Julien from Cochinchina, was found still living after having been wrapped up in paper for eight months during the voyage to France.

The animal of a specimen of *Hyria contorta* from China was found to have the lobes of the mantle separated along all the circumference and to possess all the other characters of *Unio* or *Anodon*, differing completely from the *Hyria arctostoma* of the Amazon.

Pp. 86-100 contain Bibliography and Obituary.

The early publication of a general and systematic index to Vols. I-XX of the Journal is announced.—C. P. G.

DESCRIPTIONS OF FIVE NEW SPECIES OF SHELLS.

By G. B. SOWERBY, Junr.

(From the Proceedings of the Zoological Society of London,
November 3, 1874.)

I. TRITON (EPIDROMUS) COMPTUS, sp. nov. Plate LXXII
figs. 5, 5a.)

T. testa oblongo-turrita, rufo-fusca, castaneo maculata, undique creberrime decussate tigrata, tigris eximie granulosis, interstitiis transversim striatis; anfractibus rotundatis, maenlis angustis oblongis transversim balteatis; varicibus paucis, rotundatis, castaneo grandimaculatis; apertura subexfansa, labio externo reflexo, levii, ad marginem lineis castaneis minutis netatis; lamina columellari levii, pellucida, polita; canali brevissimo recurvo; long. 54, lat. 20; apert. long. 20, lat. 10, mill.

Shell of the usual general form of an *Epidromus* (Klein) as separated from the genus *Triton* (Lamarck), of a reddish brown color, blotched and spotted with dark chestnut brown, closely and exquisitely cancellated and granulated; whorls rounded, belted with

narrow oblong spots; varices few, rounded, with large chesnut blotches; aperture rather expanded; outer lip reflexed, smooth, with small linear chesnut spots at the edge; columella covered with a smooth polished transparent enamel; canal very short, recurved.

Hab. Hongkong.

A single specimen of this very beautiful species was dredged by William Cuthill, Esq., in the vicinity of Hongkong. A specimen of it in the old collection of the British Museum had been inadvertently confounded with *Triton Sowerbyi*, (Reeve), from which it is obviously distinct. The shell presents characters common to several species but differs from all its congeners in the form of the whorls being more rounded, and in the smoothness of the mouth. Its nearest analogue is perhaps *T. testaceus*, (Mörch), from which it differs in the last whorl being larger, the mouth more open, and the spire more acute. It differs in the same respects from *T. clathratus*, (Sowerby), besides being much more finely cancellated.

2. *OVULUM SINENSE*, sp. nov. (Plate LXXII, figs. 1, 1a.)

O. testa pyriformi, ventricosa, antice subattenuata, utrinque subrostrata, tenutiuscula, subpellucida, alba, linea aurantiaca ad marginem cineta, transverse obsolete striatula, striis longitudinalibus irregularibus obscure decussata; apertura subpatula, arcuata, intus lactea; columella superne callosa lirata, inferne subexcavata, ad canalem valide uniplicata; labio externo denticulato; long. 30, lat. 19, alt. 13, mill.

Shell pyriform, ventricose, somewhat attenuated posteriorly, slightly beaked at both ends, rather thin, semi-transparent, white, encircled with an orange line at the margin, very obscurely decussated; aperture rather wide, arched, milk-white within; columella with a thickened ridge at the upper part, somewhat excavated below, with a strong plait at the canal; outer lip denticulate.

Hab. Hongkong (*Cuthill*, two specimens).

There is a specimen of this species also in the British Museum, which was placed with *O. adriaticum*, from which it differs considerably in form and structure, being much stronger and more ventricose.

3. *STROMBUS ROBUSTUS*, sp. nov. (Plate LXXII, figs 3, 3a.)

S. testa conica, solida, ventricosa cœruleo-alba, castaneo zonata et maculata; spira parviuscula acuta; anfractibus noduloso-angulatis, superne spiraliter striatis; anfractu ultimo in medio sere leví, deinde versus marginem conspicue striato, ad basin sulcato; apertura elongata, canali superne spiram ascendente; columella callosa, alba, obsolete lirata; labio externo emarginato, intus lirato; long. 48, lat. 31, mill.

Var. β testa luteo-fusco fasciata.

Shell conoid, ventricose, solid, bluish white, banded and blotched with dark brown; spire rather short, acute; whorls angulated and noduled at the angle, spirally striated above; last whorl almost smooth in the middle, then towards the margin conspicuously striated, grooved at the base; aperture elongated, with a canal at the upper part, running up the spire; columella furnished with a thickened white enamel, which is faintly ridged; outer lip emarginated; interior ridged.

Hab. Hongkong (*Cuthill*).

The characters of this species are much the same as those of *S. septimus* (*Duclos*), of which Mr. Cuthill has sent me several specimens from the same locality; but the form is very different, the latter being a narrow shell of the form of *S. succinetus* (*Linn*), which is found in Ceylon.

4. *COLUMBELLA (ANACHIS) SINUATA*, sp. nov. (Pl. LXXII., figs. 2, 2a).

C. testa fusiformi, rufofusca, cœruleo-albo et brunneo variegata, tenui, pellucida; spira acuminata; anfractibus 9, planate-convexis, levibus, longitudinaliter regulariter valide costatis; costis ad anfractum ultimum, versus marginem medio tuberculatis; apertura oblonga, intus cœrulea, costata; columella corrugata, tenuiter encaustica; canali brevi, profundo, recurvo; labio externo superne elevato, expanso, incrassato, medio sinuato profundo emarginato; long. 17, lat. 9, mill.

Shell fusiform, reddish brown, variegated with bluish white and dark brown, thin, transparent; spire acuminate; whorls nine in number, flatly convex, smooth, strongly ribbed longitudinally; the ribs on the last whorl towards the margin tuberculated in the middle, transversely ribbed at the base; aperture oblong, interior blue, ribbed; columella wrinkled, covered with a transparent, shining enamel; canal short, deep, recurved; outer lip thickened and expanded at the upper part, and with a broad deep sinus in the middle.

Hab. Upper California.

A very remarkable little shell, almost generically distinct from any hitherto known species; I think, however, it truly belongs to the section *Anachis* (*H. & A. Adams*). The sinus is almost like that of *Pleurotoma*, only it is in the middle of the lip.

5. *AMPULLARIA CATAMARCENSIS*, nov. sp. (Pl. LXXII. fig. 4).

A. testa subglobosa, imperforata, solidiuscula, lutescenti-alba, atrofusco fasciata; undique, subtilissime reticulata; epidermide tenui, lutescente; spira exserta, parviuscula, subacuta; anfractibus convexis; apertura ampliuscula; columella callusa, fusa suffusa; labio externo subincrassato, vis reflexo; long. 70, lat. 60; apert. long. 50, lat. 35 mill.

Shell rather globose, imperforate, rather solid, yellowish white, banded with dark brown, very finely reticulated throughout; epider-

mis thin, yellowish; spire rather small, exserted; whorls convex, aperture rather wide; columella thickened, suffused with brown, outer lip somewhat thickened, scarcely reflexed.

Hab. Catamarca (on the Andes of Peru).

A fine species of the type represented by *A. columellaris*.

[The original paper is accompanied by a coloured plate, to which the references in this article apply.—ED. Q.J.C.]

ON THE INTRODUCTION OF PLANORBIS DILATATUS (GOULD.) INTO THE BRITISH ISLES.

MR. THOS. ROGERS read a paper before the Natural History Section of the Manchester Literary and Philosophical Society, on April 13th, 1870, upon the introduction of this species, which he discovered in June, 1869, adhering to the stones immediately below the surface of the water in the Bolton canal at Pendleton, and in close proximity to the blowing room refuse discharge, and warm water discharge from the engines of Messrs. Armitage's cotton mill. He also afterwards found the same species under similar conditions in the canal adjoining the mills of Messrs. Rylands, at Gorton. After examining all the circumstances under which the Mollusk was found, he was led to believe that its introduction into this country was by means of American cotton, which had been used for such like war purposes as barricades for steam-boats or river defences by the soldiers in the civil war during the presidency of Abraham Lincoln, and which had been accidentally submerged in water and redried with the fry or spawn masses of the Planorbis attached to its fibres previous to its exportation to England, and this ultimately finding its way with the cotton refuse into the canals adjoining the aforementioned mills. He also remarked the abundance of the beautiful fresh water Zoophyte, *Plumatella repens*, which is found in both habitats of the Planorbis, and on the dead branches of which it seems to find its favourite food. Mr. Rogers said that since the year 1869 (when the mollusk was found in small quantity) it had increased its area of distribution and multiplied so much as to be likely to become one of the commonest of our local shells.—Extracted from the Proceedings of the Society.

BIBLIOGRAPHY.

ORNITHOLOGY & CONCHOLOGY
OF THE COUNTY OF DORSET.

BY J. C. MANSEL-PLEYDELL, F.G.S.

This little work contains 120 pages, half of which are devoted to Conchology. The Introduction occupies 6 pages and describes some of the habits of several of the important genera, and treats of the relationships of our present fauna with those of preceding periods. It also furnishes the proportional number of the representative species found in Dorset of each of the 9 types into which Professor Forbes divided the British Marine Mollusca :—*viz.*

I. The Lusitanian type. The Dorset members of the Lusitanian or Mediterranean group which just impinge upon the British are five out of the fourteen cited by Forbes and Hanley.

II. The South British type, confined within a well-marked range along the southern and south-western coasts of England ; eighteen out of twenty-two.

III. The European type, represented by species that are equally diffused and abundant in most parts of the British seas ; all out of the forty-three.

IV. The Celtic type, a group especially characteristic of Great Britain, many of its members being of ancient origin and well known in the fossil state ; thirty-nine out of forty-three.

V. The British, an assemblage of species little known elsewhere or even quite unknown out of the British seas. Of the seven species cited as representatives of the British type, being most abundant in Great Britain, and well-known in a few localities elsewhere, Dorsetshire claims five.

VI. The Atlantic type, comprising Molluscs common on the western coasts of Britain, rare in the Irish seas, and for the most part absent from the German Ocean : sixteen out of thirty-one.

VII. The Oceanic type, represented in Britain by the genus *Ianthinum* and possibly *Sisurilla ciliata*, has no representative on our coast excepting the Cephalopods, which are ranked in this group.

VIII. The Boreal type, an assemblage of northern forms, many of which are either absent in the south, or become rarer as we proceed southwards ; of the thirty-three cited by Forbes and Hanley, Dorsetshire has four.

IX. The Arctic type, comprising few of the most northern shells, of which none are found on the coasts.

Of the Land and Fresh-water shells, the author enumerates 71 species, 40 land and 31 fresh-water, but the occurrence of some of these he has not been able personally to verify.

There is an absence of some species which we should have expected to occur, but doubtless a more extended and closer search will reveal others, especially amongst the more minute species. We however hail it as a solid contribution to our better knowledge of the fauna of Dorset.

The following articles appear in the April number of the *Journal de Conchyliologie*, 1875.

CROSSE, H.—Note sur le *Phyllaplysia Lafonti*, Fischer (Note on *P. Lafonti*, F.), pp. 101—104.

This very rare naked mollusk was observed by M. Crosse in the basin of Arcachon. It never swims, but crawls in a very similar way to a slug, progressing however very quickly. It adheres so firmly to any smooth surface that it is very difficult to detach it.

FISCHER, P.—Remarques sur la coloration générale des coquilles de la côte occidentale d'Amérique (Remarks on the general system of colouring of the shells of the West Coast of America); pp. 105—112.

As a general rule, whilst the shells of the Arctic Seas are obscurely coloured, and those of temperate seas not very brilliant, the shells of the tropics are handsomely colored and ornamented with variegated spots, lines and bands. The West Coast of America forms however a striking exception from the number of shells of a black or very dark color, many bearing such appropriate names as "ater," "maestus," "funebris," "tristis," &c. Dr. Fischer gives a list of the most striking examples of this (from which however *Murex radix* is somewhat unaccountably omitted) and then proceeds to consider the causes which may have produced this funeral fauna. He mentions five—the narrow extent of the torrid region, the cold currents both North and South, the absence of coral reefs, the uniformly North and South direction of the coast, and the poverty of the terrestrial fauna; but he at the same time acknowledges that these circumstances are insufficient to account for the fact, and that a complete explanation has not yet been found.

FISCHER, P.—Des anomalies de l'opercule dans les genres *Volutharpa* et *Buccinum*. (On the anomalies presented by the opercula of *Volutharpa* and *Buccinum*.); pp. 112—114.

Of the specimens of *Volutharpa ampullacea* Middendorf, found in Behring's Straits, the majority have no operculum, but about 10 per cent. bear traces of that organ, in the shape of a smooth and whitish surface, which is strikingly visible against the slatey black color of the rest of the foot, whilst 15 per cent. have a well developed operculum, and moreover at an advanced period a sort of second operculum is formed underneath the first. Dr. Fischer compares these facts with Mr. Jeffreys' observations on the double and triple opercula of *Buccinum undatum*.

GLOYNE, C. P.—Notes supplémentaires sur les Mollusques terrestres de la Jamaïque (Supplementary notes on the terrestrial Mollusca of Jamaica); pp. 115—126.

The author had given a first list of the land-shells of Jamaica, collected by himself in, Vol. XX. of the Journal (pp. 26—47). He now supplements it by a second list, containing additions, corrections, and species, which though not collected by himself, he can give the localities from trustworthy sources, prefacing his paper by a few general geographical remarks.

There are 62 additional species enumerated; and one new species—*Adamsiella irrufata*, Gloyne, from Brownstown is described, as well as a new variety *pallida* of *Adamsiella Grayana* Pfr.

HIDALGO, J. G.—Supplément au Catalogue des Coquilles terrestres recueillies dans l'Amérique méridionale (Supplement to the Catalogue of Land-shells collected in South America); pp. 127—131.

In the first number of the Journal for 1870 the author had given a list of the land-shells collected in South America by the Spanish naturalists of the Pacific Expedition. He now publishes a supplement with additional species and corrections.

The following species are figured, *Succinea Peruviana*, Philippi, (Pl. vii. f. 1); *Streptaxis uberiformis*, Pfeiffer, (f. 3); *Bulinus scalaroides*, Phil. (f. 4); *B. Atacamensis*, Pfr. (f. 5); *B. Ochseni*, Dunker (f. 2); *Pupa Pazi*, Hidalgo (f. 7); and *Bulinus Colmeiroi* Hid. (f. 3). *Helix Baezensis*, Hid., should take the name *Helix Cuzcana*, Phil. *Bulinus albicans*, Broderip, is considered a small-sized variety of *B. albus*, Sowerby. The shell previously referred to *Bulinus Gibbonius*, Lea, is made a separate species, *B. Jumenosi*, Hid. *B. Monteridensis*, Pfr., should be *B. sporadicus*, Orbigny. *Cyclotus Fischeri*, Hid., is now considered a variety of *C. giganteus*, Gray; 211 species in all were collected by the Spanish naturalists, 9 of which were new.

FISCHER, P.—Note sur le *Trochus moniliferus*, Lamarck (Note on *T. moniliferus*, Lam.) ; pp. 131—133.

Lamarck described a fine shell in his private collection as *T. moniliferus*, and a good figure was given in Kiéner; Philippi by a singular mistake applied the name to a large specimen of *T. annulatus*, Martyn. The habitat remained unknown for a long time, and I. is like having discovered the shell in Japan considered it new and described it as *T. Alvinæ*. The author establishes the synonymy, and as there is also a fossil shell of the Paris basin of nearly the same name—*T. monilifer*, Lam.—proposes for the latter the name of *T. dyschères*.

CROSSE, H.—Note sur l'*Helix Leytensis*, Pfeiffer, des Philippines (Note on *H. Leytensis*, Pfr. from the Philippines); pp. 133—136.

The receipt by Dr. Hidalgo of two perfect specimens of this very rare shell, enables a good figure (Pl. vi. f. 3) and description to be given. Both Reeve's and Pfeiffer's figures represent immature shells.

CROSSE, H.—Descriptions d'espèces de Mollusques inédites, provenant de la Nouvelle Calédonie (Descriptions of unpublished species of Mollusca from New Caledonia); pp. 136—141.

Diplomphalus Fabrei, Cr. (Pl. vi. f. 1) very near *D. Megei*, Lambert, Baie du Sud; *D. Megei*, Lambert, var. β , Baie du Sud; *Bulinus Alexander*, Cr. var. ϵ (Pl. vi. f. 4); *Fossarus Caledonicus*, Cr. (Pl. vi. f. 6) Baie du Sud.

CROSSE, H.—Description d'un *Pupina* nouveau provenant du N.E. de l'Australie (Description of a new *Pupina* from the N.E. of Australia); pp. 141—143.

Pupina Petterdi Cr. (Pl. vi. f. 5); and var. β (f. 5a) near *P. Coxii*, Morelet.

CROSSE, H.—Diagnoses Molluscorum Novæ Calédonie incolarum (Diagnoses of Mollusca inhabiting New Caledonia); pp. 143, 144.

Helix Derbesiana and *H. Berlierei*.

Bibliography, and Palaeontology, pp. 144—194.

Under the head of "News" M. Crosse mentions the following items, pp. 194—196.

The Rabbi Mardochée has recently brought from Morocco a number of land-shells which prove that the Mediterranean fauna (Lusitanian of Woodward) extends to Cape Nun; at what particular point the West African fauna begins is as yet unknown.

Several instances of the vitality of Unionidæ, when removed from their native element, are mentioned.

Three Italian naturalists are now exploring New Guinea, Signor Beccari in the North and Signor d'Albertis and Tommasinelli in the South.

C. P. G.

Japanese Gastropoda. A List of the Gastropoda collected in Japanese Seas, by Commander H. C. St. John, R.N.

By Edgar A. Smith, F.Z.S., of the British Museum—Annals & Mag. Nat. Hist., June, 1875; Series IV., Vol. XV., pp. 414—427.

This enumeration, which is to be continued, embraces the names and localities of 52 species of Gastropoda. Nineteen species are mentioned as new, the following being characterized:

<i>Pleurotoma vertebrata</i> ;	<i>Murex (Cerastoma) endermonis</i> ;
<i>P. Sancti-Ioannis</i> ;	<i>Euthria fuscolabiata</i> ;
<i>P. Jeffreysii</i> ;	<i>Fusus (Siphon?) manchuricus</i> ;
<i>P. chocolata</i> ;	<i>Nassa tenuta</i> ;
<i>P. inconstans</i> ;	<i>Nassa fuscolineata</i> ;
<i>P. tuberosa</i> ;	<i>Buccinum Jeffreysii</i> ;
<i>P. patruelis</i> ;	<i>Admete ovata</i> :
<i>Bela iessoensis</i> ;	<i>A. globularis</i> .

Full descriptions are promised to be given "elsewhere" of the following new species of Terebridae:

<i>Terebra albozonata</i> ;	<i>T. melanacme</i> ;
	<i>T. (Myurella) bathyraphe</i> .

Descriptions of some new Shells from Kerguelen's Island.—By Edgar A. Smith, F.Z.S.—Annals and Mag. Nat. Hist., July, 1875; Series IV., Vol. XVI., pp. 67—73.

These are the undescribed species brought home by the Rev. A. E. Eaton, naturalist to the British Transit-of-Venus Expedition to Kerguelen's Island. It is intended to publish elsewhere, complete and detailed accounts of all the specimens obtained and brought home by him. Of mollusca the number is small, only about 20 species; but of these the proportion of new forms is large, and several of them very remarkable discoveries. One new genus, *Eatonia*, is characterized, and the following new species are briefly described:—

Struthiolaria mirabilis. Swain's Bay.

Buccinopsis Eatoni. Swain's Bay, and Royal Sound.

Trophon albolabirinus. Swain's Bay, and Royal Sound.

Littorina setosa. Swain's Bay.

Rissoa Kergueleni. On a sponge.

Eatonia Kerguelensis. On a sponge.

- Eatonia caliginosa.* Swain's Bay.
E. subrufescens. On a sponge.
Skenea subcanaliculata. On a sponge.
Scissurella supraplicata. Swain's Bay.
Solenella gigantea. Royal Sound.
Yoldia subaequilateralis. Swain's Bay.

On the Development of the Pteropoda.—By M. H. Fol.—*Annal. & Mag. Nat. Hist.*, June, 1875; Ser. IV., Vol. XV., pp. 439—441. (Translated from the *Comptes Rendus*, Jany. 18th, 1875, p. 19).

Notes on an Examination of 4 species of Chitons, with reference to Posterior Orifices.—By W. H. Dall.—*Annals & Mag. Nat. Hist.*, June, 1875; Ser. IV., Vol. XV., pp. 442—443. (From the "Bulletin of the Essex Institute," Vol. VI., August, 1874).

Capture of an enormous Cuttle-Fish off Boffin Island, on the coast of Connemara.—By Thos O'Connor, Zoologist, June, 1875; S.S. Vol. X., pp. 4502 and 3.

Details given by the writer, who is a sergeant in the Royal Irish Constabulary on that Island.

Notice of a gigantic Cephalopod (*Dinoteuthis proboscidus*) stranded at Dingle, in Kerry, 200 years ago.—By A. G. More, F.L.S., &c.—*Zoologist*, July, 1875; S.S., Vol. X., pp. 4526—4531.

Life Histories of the Mollusca.—By A. S. Packard, jun. *American Naturalist*, May, 1875, Vol. IX., pp. 282—307.

An elaborate illustrated article dealing with the classification of the mollusca, and the development of the several groups, *Lamellibranchiata*, *Cephalophora* and *Cephalopoda*.

MISCELLANEOUS NOTES.

A communication was read to the Zoological Society of London on the 20th of April from Mr. R. J. Lechmere-Guppy, on the occurrence of *Helix coactiliata* in Trinidad, and on the general distribution of the land and freshwater mollusca of that island. A second communication from Mr. Guppy contained a note on a variety of *Bulinus constrictus* found in Venezuelan Guiana.

A note from Lieut.-Col. R. H. Beddome, on some new operculate land-shells from Southern India and Ceylon, was laid before the Zoological Society at its meeting on June 1st. The discoveries of true *Diplopomatina* in Southern India, and of *Nicida* in Ceylon were alluded to as being of special interest.

At the same meeting a communication from Mr. G. French Angas, was read describing three new species of Australian Shells, under the names of *Helix Forrestiana*, *Helix Broughami*, and *Euryta Brazieri*.

A communication from Mr. Henry Adams was also read on two new Land-shells: these were proposed to be named respectively *Eurycratera Farafanga*, found on a sandy plain in the South-East of Madagascar, near the Farafanga River, and *Pupinopsis Angasi*, from the Louisiade Archipelago, in the South-East of New Guinea.

Some time ago Prof. Michael Foster and Mr. A. G. Dew Smith read a paper before the Royal Society on the behaviour of the hearts of Mollusks under the influence of electric currents.

We regret to announce the death of the distinguished French naturalist, Professor G. P. Deshayes, on the 9th of June last, after a long illness. He was well known as the author of the splendid work on the "Tertiary Mollusca," of the "Paris Basin," and other important conchological and paleontological publications.

At a sale by auction, on the 29th of June last, by Mr. J. C. Stevens, of Covent Garden, of a collection of shells, which comprised specimens from the Norris and Dennison collections, including type shells, figured by Reeve, we notice that a beautiful specimen of *Cyprea aurantia* went for £3 5s. od.; a very fine well-marked specimen of *Conus zonatus*, for £2 5s. od.; a beautiful shell of *Harpa imperialis*, for £1 8s. od.; another for £1 17s. 6d.; an example of *Cyprea nivosa*, from the Norris collection, £6; the unique type specimen of *Conus racemosus*, for £3 15s. od.; *Conus zonatus*, for £2; a very beautiful specimen of *Conus nobilis*, £3 5s. od.; besides a large number of lots including more than one species.

LIST OF THE MARINE SHELLS OF HASTINGS.

BY A. W. LANGDON.

I have pleasure in sending the following list of sea shells from this coast. It is doubtless very imperfect, but it comprises all the species I have been able to hear of since my attention was drawn to the subject a few months ago. I hope to hear of additions from time to time, and will not fail to communicate them.

The shore, in front of the town, and some miles to the east and west, is composed of shingle, from the wasting of the South Downs, with beds of sand and rock exposed at low tide.

Owing to the prevalence of strong S.W. winds the beach is continually shifting, so that there is little opportunity for the growth of Mollusca, other than mussels, limpets, and purple-shells, within the reach of personal observation. But fortunately, for Naturalists, there exists a shoal, locally termed the "Diamond," a few miles to the S.E., which is much frequented by fishermen, and which yields a great variety of crustacea, with a fair sprinkling of mollusca. It is from this source that most of the following species were obtained. The winter and early spring is the time when the boats most usually resort to the "Diamond," and then the shells may be procured from one or two local dealers, whose little "curiosity shops" in the immediate neighbourhood of the Fish market, are probably known to most visitors at Hastings.

1. *Anomia ephippium*, L.—Occasionally brought in by fishermen; was formerly common.
2. *Ostrea edulis*, L.—Very fine specimens of the solitary variety, from the Diamond ground.
3. *Pecten pusio*, L.—A few detached valves have been picked up on the beach; it is tolerably common from the scallop beds off Brighton.
4. *P. varius*, L.—Not uncommon, but seldom large or well coloured.
5. *P. opercularis*, L.—Extremely abundant on the Diamond ground, and of every colour—white, violet, orange, &c. The local name is *squin* or *quininia*. It is eaten by all classes.

6. **Pecten opercularis** var. *lineata*.—From the same locality; not uncommon.
7. **P. maximus**, *L.*.—Common, and sometimes very large.
8. **Lima hians**, *Gmelin*.—A single valve of a young shell was brought to me, attached to the roots of *Antennularia antennina*.
9. **Mytilus edulis**, *L.*.—Most abundant on the rocks, and common food of the *Uraster rubens* and *Purpura lapillus*, but of small size. Larger shells are sometimes brought in.
10. **Do.** var. *pellucida*.—Occasionally amongst others on the rocks.
11. **M. modiolus**, *L.*.—From deeper water; uncommon.
12. **M. barbatus**, *L.*.—Frequently attached to sea weeds and zoophytes thrown up by the waves.
13. **Modiolaria marmorata**, *Forbes*.—Sometimes attached to *Pecten maximus*; also at the roots of zoophytes, &c.
14. **Nucula nucleus**, *L.*.—Not common in good condition.
15. **N. nitida**, *G. B. Sowerby*.—Sometimes brought in by trawlers.
16. **Pectunculus glycimeris**, *L.*.—Very common on the Diamond ground; of large size, and well coloured.
17. **Arca lactea**, *L.*.—A single valve was found amongst the roots of *Antennularia*.
18. **Cardium echinatum**, *L.*.—Common, brought in by trawlers.
19. **C. edule**, *L.*.—The shore is too rocky for this species to be very abundant.
Do. var. *rustica*.—Mud-stained specimens.
20. **C. Norvegicum**, *L.*.—Common.
21. **Cyprina Islandica**, *L.*.—A few very large shells have been brought in by deep sea fishermen.
22. **Tapes virgineus**, *L.*.—Moderately common and well marked.
23. **T. Pullastra**, *Montagu*.—Seldom in good condition.
24. *Do.* var. *perforans*.—In rock perforations.
25. **Lucinopsis undata**, *Pennant*.—I have only met with two specimens—both milk-white.
26. **Tellina crassa**, *Gmelin*.—Not uncommon, from the Diamond ground, and sometimes very large and fine.
27. **T. Balthica**, *L.*.—Usually lemon-coloured.
28. **T. tenuis**, *Da Costa*.—Not uncommon at Hastings.
29. **T. fabula**, *Gronovius*.—*Do.*
30. **Donax vittatus**, *Da Costa*.—Extremely common; dead shells often strew the beach in hundreds.
31. **Mactra solida**, *L.*.—Rare on this coast.
32. *Do.* var. *elliptica*.—*Do.*

34. **Mactra subtruncata**, *Da Costa*.—Detached valves.
M. stultorum, *L.*.—Common.
 35. Do. var. *cinerea*.—Rare.
 36. **Lutraria elliptica**, *Lamarck*.—Occasionally brought in by trawlers, but usually dead.
 37. **L. oblonga**, *Chemnitz*.—Detached valves have been picked up on the beach.
 38. **Scrobicularia prismatica**, *Montagu*.—Occasionally found on the Diamond ground.
 39. **S. alba**, *Wood*.—Not uncommon.
 40. **S. piperata**, *L.*.—Dead shells are common in a bed of mud or clay, near St. Leonard's : probably it is to be found alive.
 41. **Solen ensis**, *L.*.—Usually very small.
 42. **S. vagina**, *L.*.—Not common.
 43. **Corbula gibba**, *Olivier*.—Detached valves.
 44. **Mya truncata**, *L.*.—Fine specimens are occasionally brought in by trawlers. It is rare at Hastings, but common a few miles to the eastward.
 45. **M. Binghami**, *Turton*.—Rare ; from deep water.
 46. **Saxicava rugosa**, *L.*.—Not common here.
 47. **Pholas dactylus**, *L.*.—Dead shells are abundant in perforations in the rocks. I have not met with it living.
 48. **P. candida**, *L.*.—Very common in the rocks exposed at low water.
 49. **P. parva**, *Pennant*.—Much less frequent than the last.
 50. **P. crispata**, *L.*.—Dead shells.
 51. **Teredo** sp.—In floating wood.
 52. **Dentalium entalis**, *L.*.—Dead shells are very common.
 53. **Chiton fascicularis**, *L.*.—On rocks at low water.
 54. **C. cinereus**, *L.*.—Do., common.
 55. **Patella vulgata**, *L.*.—Most abundant, but of little beauty. It is sold in the streets of Eastbourne for food, but does not appear to be eaten at Hastings.
 56. **Fissurella Groeca**, *L.*.—Dead shells—uncommon.
 57. **Trochus magus**, *L.*.—Dead shells are sometimes brought in by trawlers in great numbers.
 58. **T. cinerarius**, *L.*.—From deep water : small shells, perhaps the var. *electissima*.
 59. **T. granulatus**, *Born*.—From the Diamond ground : rare.
 60. **T. ziziphinus**, *L.*.—Common.
 61. **Lacuna crassior**, *Montagu*.—Dead shells.
 62. **Littorina obtusata**, *L.*.—Common on rocks covered with Fuci
 63. **L. littorea**, *L.*.—White shells sometimes occur. This species is not so abundant as at most places. The shops in the town are supplied from Whitstable, &c.
 64. **Scalaria communis**, *Lam.*.—Occasionally picked up dead.

66. *Natica catena*, *Da Costa*.—Common, but seldom fine.
Burrows in sand at verge of low water.
67. *N. Alderi*, *Forbes*.—Brought in by trawlers.
68. *Purpura lapillus*, *L.*.—On rocks at low water. Next in abundance to the limpet and mussel. The local name is "Man-sucker." It is eaten in quantities by the lower classes.
69. *Buccinum undatum*, *L.*.—Sometimes very large.
70. Do. *monstr. sinistrorum*.—Very rare; I have only heard of two specimens.
71. Do. *monstr. acuminatum*.—Small shells, with the upper whorls flattened. Rare.
72. *Murex erinaceus*, *L.*.—Not uncommon.
73. *Nassa reticulata*, *L.*.—Sometimes brought in by trawlers in great numbers.
74. *N. incrassata*.—Not so common as the last.
75. *Pleurotoma turricula*, *Montagu*.—Dead shells: not very common.
77. *Philine aperta*, *L.*.—A single specimen, taken, I believe, from the stomach of a fish.
78. *Loligo vulgaris*, *Lam.*.—Common.
79. *Sepiola Rondeleti*, *Leach*.
80. *Sepia officinalis*, *L.*.—Common.

Reversed form of *Helix hortensis* at Bristol.—In the early part of May I found a specimen of a sinistral *Helix hortensis*; it was in company with many *Helix nemoralis* and *Helix hortensis* of the ordinary form, in a hedge not far from Coombe Dingle near Bristol. Last year in the spring my sister Miss Jessie Hele found an immature specimen of the same uniform yellow color as the specimen I found (which she has since reared to maturity) at Keynsham, which is about 10 miles from Bristol.

The country round Bristol is rich in land shells. We have found *Helix fusa*, *Helix aspersa* var. *exalbida* and many other good species in the neighbourhood.—FANNY M. HELE, June, 1875.

Local shells at Bank Wood near Wakefield.—The following rare and local shells have been found at Bank Wood near Wakefield, by Mr. Jackson, of Midgley: *Helix fusa*, *Vertigo identula* var. *squamella*, *Cochlicopa tridens* var. *crystallina*, and other more common forms. The variety of *C. tridens* was found amongst numerous specimens of the type, with which they were connected by several gradations of colour from white to deep rufous brown.—GEORGE TAYLOR, July, 1875.

CONCHOLOGICAL DIFFICULTIES; OR, SPECIES
VERSUS VARIETIES.

BY EDWARD SIMPSON.

In looking over a collection of shells, or in reading the description of them by various authors, the student is apt to get greatly confused, and to wonder why there are so many species, and what can be the principle upon which they are formed. In order to explain what I mean, I propose going through the works of several authors, and comparing them together. I will first give an extract from Jeffreys' British Conchology, vol. 1., page xvii. of the introduction, where he says "Certain definite forms, called species, exist ; and that they constitute, more or less extensive groups of individuals, which resemble each other, as well as their parents and offspring, to the same extent as we observe in the case of our own kind. These groups, to deserve the name of species, must be distinct from others ; because, if any of them are so intimately blended together by intermediate links, so as to make the line of separation too critical, the test fails, and a subordinate group, or what is called a 'variety,' is the result. For this reason it is indispensably necessary to compare as great a number of individuals as possible ; and especially a series of different ages and sizes, commencing *ab ovo*, as well as specimens collected from various localities." He then goes on to speak of the right of every naturalist : "To follow the bent of his own discretion or inclination in the extension or reduction of species, subject only to the opinion of his scientific compeers," and then speaks of varieties : "Besides species, and holding a subordinate rank to them in the great host of Nature's works, are certain forms, called 'varieties,' which are not less definite, but more difficult to separate from their typical or specific form. They are off-shoots of species, and originate in some peculiarity of climate, situation, composition of soil, or water which they inhabit ; the nature or supply of food, and various other conditions. The characters by which they usually differ from species consist of size, comparative proportions of different parts, colour, and degree of sculpture, and the investigation of forms thus changed, or modified is often extremely perplexing." * * * * * "Varieties are of two kinds — permanent and local. The former are called 'races,' and have many of the characters of true or typical species with which they associate." And further on he adds : "I believe it may now be considered a well-established rule that all distinct groups of individuals living together, and having common feeding ground, and which are not connected or blended with each other by insensible gradation, are *prima facie* entitled to the rank of species. A contrary opinion used formerly to be entertained by some naturalists, and it was not unusual to found a claim to specific distinction on the fact that the specimen thus distinguished did not occur with

the species from which it was proposed to separate them, they apparently forgot that the very difference of locality or habitat, with its accompanying condition, caused the variation in question." I wish to call particular attention to the extract A, as I shall have occasion to use it as a test in several cases. First of all, I take the genus *Succinea*. This, according to Reeve and Jeffreys, consists of three species, *S. putris*, *elegans*, and *oblonga* (Forbes and Hanley make but two). But besides these species, Jeffreys gives two varieties of *elegans* and three of *putris*. Speaking of *elegans*, he says, "It forms a passage through its second variety from the last (*putris*) to the next species (*oblonga*). The two varieties of *elegans* are smaller than the type, but this has not anything to do with it, because, as he says, when speaking of the genus *Polydium* (page 18) "Size, substance, sculpture, and lustre are not of much account, as they mainly depend on the chemical ingredients of the water inhabited by the molluscs, as well as their supply of food." His reasoning, of course, is not limited to any particular genus, but applies alike to all. Now, remembering what was stated above by him, that *elegans* forms a passage from the first to the third species by its second variety (*oblonga*). After applying his own test, it certainly appears (A) that these three forms are so "intimately blended together by intermediate links," that they cannot be fairly considered a distinct species.

Every conchologist is aware of the difficulty of distinguishing some of the species of *Zenites*. The distinctions between some of them are so very trifling, that it requires much more faith than I am possessed of to believe that they are really distinct. *Z. purus* resembles *Z. radiatus* so closely that Reeve observes that "A careful application of the lens is necessary to bring out its specific characters in obvious relief." Jeffreys (p. 116) says, "*Z. radiatus* resembles *Z. purus* 'in the size and form of the shell; but the peculiar sculpture, more glossy appearance, and narrower umbilicus of the present species will easily distinguish it from *Z. purus*.' But he has already stated (p. 18) that 'size, substance, sculpture, and lustre are not of much account.' And we shall see as we proceed to another genus, that these very distinctions are not even allowed to constitute a variety. Few shells have been the cause of greater controversy than *Hellsia nemoralis* and *H. hortensis*: are they distinct species or not? Gray, Norman, and others unite them. Jeffreys (p. 165) says he never found *H. nemoralis* and *hortensis* living together, and in speaking of a variety of *Limnia palustris* (p. 114), he says, as a reason for not considering it a species, "that it is not found in company with any other form." I do not clearly understand this reasoning. Then supposing *H. nemoralis* and *hortensis* to be found together (as they certainly may be), it would appear to prove that they were specifically distinct, even taking Jeffreys' own definition of a species, which is a group of individuals which resemble each other as well

as their parents and offspring to the same extent as we observe in the case of our own kind." (p. 17). Whilst if they are *not* found together, and *H. hortensis* is only a variety, how is it that the variety becomes permanent? Do not shells follow the same laws as other animals in returning back to the original stock, or in throwing off other varieties which differ from the variety itself as much as it differs from the typical species? But, as *H. hortensis*, when living by themselves, propagate animals resembling themselves, and those from which their parents sprang, they also, in conformity with the definition, must be considered as a species. Another reason Jeffreys gives for not considering them distinct species is that they are connected by the intermediate form, *hybrida*, but, as we shall see presently, the fact of there being no intermediate form is not always allowed to separate species. Some of the specimens of *H. rufescens* and *hispida* are exactly alike to my limited powers of observation. I have compared them for a long time without being able to find any distinguishing character. In addition to these, there is *H. depilata* of Gray, and *H. concinna* of Jeffreys. The latter one differs from *hispida* in being more glossy, and never globose, and in the umbilicus being considerably more open. These constitute two species. On the other hand, *H. rufescens* has its spire short and blunt; and another, as described by Jeffreys, has a smaller shell, and the spire more raised. But this is only made a variety (*H. rufescens* var. *minor*). It is thus next to impossible to discover the principle upon which conchologists proceed in manufacturing their species. This will appear more strongly in two other genera—first, the genus *Clausilia*, here there are four species, one of which *C. laminata* is separated at once from the rest, by Jeffreys, in consequence of its shell being nearly smooth, and in having its clausilium notched. It very much resembles *C. biplicata*, but differs from it in its teeth, spire, and other details, which may, or may not, entitle it to be considered a distinct species from *biplicata*. But distinctions such as these do not *always* make a species. Thus in *Carychium minimum*, Reeve (p. 127) says, "Authors are pretty well agreed that all the varieties of the little glassy shell, known throughout Britain as *C. minimum*, belong to one and the same species. Some specimens are smooth, others are obviously finely striated, and the teeth are more conspicuously developed in some specimens than in others, while the whorls vary a little in their shorter or more elongated mode of convolution."

Neither Jeffreys, Gray, nor Forbes and Hanley give any varieties. The latter mentions that it has a variety, but gives it no name. Why are not some of the differences sufficient, at all events, to make a variety? In *Azeca* and *Zua* differences slight as the above constitute two distinct species, according to Jeffreys—two genera according to other conchologists. The former united them in one genus, under the name of *Cochlicopa*, considering that the fact of *Azeca* having teeth, and *Zua* none, is not sufficient to

constitute two distinct genera. As illustrations, he gives *Helix obvoluta*, and some of the *Vertigines*, which differ from other members of the genera in being toothed or notched. Reeve separates them, and says of *Ateria*, "that it is a mollusk of different distribution and habit, and the shell has a totally distinct typical structure."—(p. 94). On the other hand, Jeffreys makes two distinct genera *Balia* and *Clusilia*, because the latter has a clausilium, or twisted internal plate, and has also oblique teeth or folds which contract the aperture of the shell. In *Balia*, the clausilium is altogether wanting, and the mouth has no teeth or folds, though it is sometimes furnished with a tubercular tooth, formed on the columnella or pillar. In the genus *Planorbis*, I mention the two species, *carinatus* and *complanatus*. This latter shell may be distinguished from the former, as Jeffreys says (p. 92), "By its narrower and more rounded whorls, as well as by the keel being placed below, instead of in or towards the middle of the periphery. It is usually larger and thicker, and is more generally diffused and plentiful." He also gives a variety of *carinatus*, viz. *disciformis*, which is often mixed up with the last (*carinatus*), (Linn. Trans., Vol. xvi., p. 385, by Jeffreys), and of which he says, "The shell is flatter and thinner, of a yellowish colour, having the last whorl larger in proportion to the others, and the keel more prominent and sharp, and placed exactly in the middle."—(p. 90). He also says (p. 92), "That *carinatus* and *complanatus* are connected together through the *P. submarginatus* of Cristofori and Jan, alias the *P. intermedius* of Charpentier." Mr. Alder, speaking of *disciformis* and *carinatus*, says, "I cannot perfectly understand the distinction between them."—(Gray, p. 239). Now if *carinatus* and *complanatus* are ranked as two species, mainly owing to the difference in the position of the keel, why is not *disciformis* in which the position of the keel is as different from either of these two, as they are from each other, also ranked as a third species? But it seems to me that as it is not so considered; if we apply Mr. Jeffreys' own test, one of these two must give way as a species, and be considered only as a variety, for these three shells certainly appear to me, by his own language (A), "to be so intimately blended together by the intermediate links as to make the line of separation too critical," and therefore the test fails, so that taking *P. carinatus* as the type, the other two, namely, *complanatus* and *disciformis*, can only be considered as varieties of it.*

In the genus *Limnaea*, we meet with some very striking differences in the species, but which, from some cause or other, only entitle the owners to be considered as varieties. Then of *L. peregra*

Note.—In speaking of the *Helix nemoralis* and *hartensis*, Jeffreys considers that the variety *hybrida* connects the two, and that therefore they are not distinct species; but here, although *P. carinatus* and *complanatus* have an intermediate form in *disciformis*, it is in this case not allowed to make any difference, and the two species referred to remain as distinct.

Jeffreys gives fourteen varieties. Some of these may clearly be attributed to local circumstances. There are some stated to have been procured from rivers, others from lakes, others from marshes by the sea coast, and others again have been "thrown up by the tide at the mouth of rivers." The most extraordinary variety (not confined to this species) in my humble opinion is *decolata*, in which the "shell is more or less eroded, spire truncate," so that the fact of a shell being *eroded* gives it the title to rank as a variety! In his Introduction p. li, Mr. Jeffreys gives several reasons which may account for erosion. I have noticed the erosion in specimens of *L. stagnalis* kept in confinement in my aquarium, which in course of time have been converted by erosion (by whatever cause produced) into *L. stagnalis* var. *decolata*, a variety which I perceive is unknown to Mr. Jeffreys.

But my paper has already exceeded the limits which I intended so that I must leave the examination of the genera and species to your readers, and I shall be very glad if some of them can help me to remove the difficulties which perplex my mind as to what *really* constitutes the difference between a species and a variety, and if they will also make clear to me what is the principle upon which the differences are formed.

DISCOVERY OF *SUCCINEA OBLONGA* (DRAPARNAUD) NEAR CORK.

I can confirm the fact of the existence of this species near Cork, a locality mentioned rather doubtfully by Jeffreys, British Conchology, Vol. I., p. 155. I found a couple of specimens under Ivy on a stone wall about two miles to the west of the town, and more numerous individuals under stones in an old quarry near Ballincollig, about five or six miles to the west of the former locality.—C. P. GLOVNE, September, 1875.

Cochlicopa lubrica var. *ovata*.—While searching for specimens of *Helix fusca* at Bank Wood, near Wakefield, I found a specimen of this variety.—J. HERDEN, Aug. 7th, 1875.

THE GENUS *EATONIA*.

Our readers will find, on referring to the Bibliographical Notice of New Shells from Kerguelen's Island at p. 86 of this Volume, a mention of a new Genus which has been characterized under the name of *Eatonia* by Mr. Edgar A. Smith. The name has however been pre-occupied by Hall in 1859. to designate a genus of fossil Brachiopoda, in compliment to the American Prof. Amos Eaton.—See Tate's Appendix to Woodward's Manual of the Mollusca, p. 59.

BIBLIOGRAPHY.

Woodward's Manual, Third Edition.

"A Manual of the Mollusca, being a Treatise on Recent and Fossil Shells"; by S. P. Woodward, A.L.S., F.G.S.; Third Edition, with an appendix of recent and fossil conchological discoveries; by Prof. Ralph Tate, A.L.S., F.G.S.; Illustrated by Miss A. N. Waterhouse and J. W. Lowry; London, Lockwood & Co., 1875, Price 7/6; pp. 542 and 86, with 24 plates and numerous woodcuts.

The fact that the Third Edition of this standard work now lies before us shows that it is suited to the wants of students in conchological science by providing for them a brief, terse, and compendious summary of our knowledge in this branch of science.

As this is the first occasion the work has come before us in our editorial capacity, we will give a brief sketch of its contents.

Chapter I. discusses the position held by the mollusca in the Animal Kingdom, and the affinities existing between each group.

The internal classification, so to speak, of the mollusks themselves, and the mutual inter-arrangement of the principal tribes, illustrated by diagrams, is next considered. Under the head of Habits and Economy is accumulated a large amount of interesting and useful information; the structure and physiology of the mollusca follows, each of the anatomical systems being examined in detail.

The structure and growth of the shell, as a most important part of a mollusk, receives special attention, and is illustrated by diagrammatic sections. Under the heading of classification we meet with the author's views upon the subjects of affinities, analogies, species, genera, families and the higher terms of classification.

The second chapter treats upon the geographical distribution of the mollusca, and is illustrated by a map showing the various molluscan provinces adopted by the author, which seem to have been founded upon the labours of botanists. The more philosophical arrangement of the world's surface into zoological regions propounded by Dr. Sclater in 1857 is briefly mentioned at the commencement, but is not in any way made the basis of the author's scheme.

The marine provinces are next described, the peculiarities of each being mentioned, also the species peculiar to it, and the affinities the province bears to others; a large amount of valuable information as to the range of the mollusca is here collected together, and whatever difference of opinion may exist as to the correctness of the author's division of the earth's surface, the whole chapter cannot fail to command the attention of the student of geographical distribution.

The third chapter is a consideration of the mollusca in time, and includes a table of geological formations, one of the characteristic genera, one showing the range of genera in time, a similar one for families, and one of the development of families, genera, and species in time. The various phenomena of geological distribution are discussed, and the chapter concludes with a numerical estimate of recent and fossil forms in every group and family.

The fifth chapter, on collecting shells, gives the various methods in use for that purpose, forms of dredging-papers as filled up by McAndrew in Norway and by Forbes in the *Ægean* Sea, remarks on their distribution in depth, and preservation for purposes of study.

The second part, which is much the largest portion of the work, is a synopsis of the known genera. Under every genus is given the etymology of its name, its synonymy, an example named, usually the typical species, the generic characters as shown in the animal and shell, the distribution of the genus in space and the number of known recent species, concluding with the distribution in time and the number of known fossil forms. Woodcuts are freely interspersed with the text, and numerous species are figured in the plates. The appendix, by Prof. Ralph Tate, is intended to bring the work up to the level of science by incorporating all new matter which has accumulated since the publication of the original work, and is worked out in the same manner as the body of the book. Having looked through the two editions, we do not find that the third edition differs from the second; they both however differ from the original one, not only by the addition of Tate's appendix, but also by the omission of the part relating to the *Tunicata*, which originally formed part of the work.

"Rambles in Search of Shells—Land & Freshwater."

By James Edmund Harting, F.L.S., F.Z.S.—106 pp. 8vo., with 10 plates of coloured figures of Shells—Price 7/6. London, 1875, Van Voorst, Paternoster Row.

This little work consists of a series of articles reprinted from "The Field," with the addition of 10 plates containing coloured figures of a number of British shells. In addition to the introduction and conclusion the work contains six chapters. The introduction consists of a brief and concise sketch of the internal organization of the mollusca and remarks upon their systems of respiration, locomotion, and reproduction.

In the first chapter the number and distribution of the British species is followed by the classification, firstly into bivalves and univalves, and secondly the separation of the latter into aquatic and terrestrial univalves ; the author then ingeniously explains the various forms of the shells by referring them to modifications of a typical form, which he considers that of *Helix* to be.

In the second and succeeding chapters the author imagines himself to be accompanying the reader in a ramble over the London Clay, showing him the most suitable localities and habitats for land and freshwater shells, and at the same time imparting a large variety of information with respect to the various species met with.

The fifth chapter finds the author and reader extending their ramble to the chalk formation, including amongst numerous anecdotes some relating to the edible character of various mollusks.

The concluding chapter contains hints to collectors of shells, how to set about it, where to go, and finally how to preserve the shells when found. Then follows a systematic list of British land and freshwater mollusca.

A most valuable and original part of the work is the list of local catalogues of British land and freshwater shells, arranged alphabetically under the names of the counties and districts to which they relate, with which it is brought to a conclusion.

Journal de Conchyliologie, July, 1875.

FISCHER, P.—Sur l'anatomie des *Neritopsis* (On the anatomy of *Neritopsis*), pp. 197—204.

The author describes the anatomy of the genus from a specimen of *N. radula* received from M. Rossiter. He considers that the affinities of the genus are evidently with the *Neritidae*, as shown by its form, the shortness of the foot, the width of the proboscis, the long, distant tentacles, &c. It however differs somewhat in its lingual dentition, as the central tooth and first laterals found in the other *Neritidae*. The transfer of the genus from the *Neritidae*, amongst which it had been placed by Grate-loup (followed by Sowerby, Reeve, Woodward, &c.), to the neighbourhood of the genus *Naria*, as proposed by Hermannsen, and accepted by Gray, Adams, and others, was decidedly wrong. Plate XI. illustrates the paper.

FISCHER, P.—Catalogue des Nudibranches et des Céphalopodes des côtes océaniques de la France (Catalogue of the Nudibranchs and Cephalopods of the Atlantic coasts of France), pp. 204—214.

A supplement to former papers on the same subject. A complete list is given of all the species known at the present time—viz., 81 Nudibranchs and 21 Cephalopods, 3 Pleurobranchs and 1 Pulmonate.

FISCHER, P.—Remarques sur l'opercule du g. *Naticina* Gray (Remarks on the operculum of the genus *Naticina*), pp. 215, 216.

The appendage near the nucleus of the operculum of *N. papilla* Gmelin, is not peculiar to the genus, but exists plainly in that of *Sigaretus levigatus* Lamarck. *Naticina* is therefore probably only a subgenus of *Sigaretus*, and the name must be changed, having been previously used by Guilding.

CROSSE H.—Description d'espèces de Mollusques inédites provenant de la Nouvelle Calédonie (Description of new species of mollusca from New Caledonia), pp. 216—223.

Zonites Hamelianus Crosse, (Pl. ix. f. 1) Baie du Sud; *Helix Vimontiana* Cr. (f. 2) Nouméa, a bulimiform species; *Bulimus porphyrostomus* Pfr. var. δ (Pl. viii. f. 2), Ile des Pins, distinguished by its white aperture; *B. Ouveanus* Dotzauer var. γ (f. 4) Siandé, also with a white aperture; *B. Hienguenensis* Cr. (f. 3) Hienguen and Ouagap,—this species was originally described by Pfeiffer as *B. Eddystoneensis* under the mistaken impression that it came from Eddystone Island in the Solomon Archipelago; *Cyprea nigricans* Montrouzier (Pl. viii. f. 5, and Pl. ix. f. 3) Kanala,—it is doubtful whether this is a distinct species or a black variety of *C. mappa*.

CROSSE, H.—Note sur une espèce manuscrite de M. le professor G. P. Deshayes (Note on a manuscript species of Professor Deshayes), pp. 223—225.

M. Crosse himself doubts very much whether this species, *Conus pseudomarmoreus* Deshayes, is really distinct from *Conus marmoreus*. The only points of difference are the smaller size, more raised spire, and the very marked transverse striae of the last whorl. Judging from the figure (Pl. ix. f. 4), it would seem to be hardly distinct.

CROSSE, H. & FISCHER, P.—Diagnoses Molluscorum novorum Guatemale incolarum (Diagnoses of new Mollusca from Guatemala), pp. 225—226.

Streptostyla Sargi and *Melania Sargi*.

CROSSE, H. & FISCHER, P.—Diagnosis *Helicis novae insulae Madagascar dictæ incolæ* (Diagnosis of a new *Helix* from Madagascar), pp. 226—227.

Helix Grandidieri, near *H. Goudotiana* Fér.

GASSIES, J. B.—Description de Mollusques terrestres et fluviaires provenant de la Nouvelle-Calédonie (Description of new Land and Freshwater Mollusca from New Caledonia), pp. 227—232.

Helix confinis, *Neritina Montrouzieri*, *N. guttata*, and *N. expansa*.

Paleontology, pp. 232—245.

BLAND, T.—Examen critique des certaines espèces du continent Américain et des Antilles, décrites dans la Monographie des *Helicina* (*Conchologia Iconica*) de L. Reeve, comme appartenant à ce genre (Critical examination of the American species of *Helicina* in Reeve's monograph), pp. 245—252. See separate article.

Descriptions of Ten New Species of Shells.

By G. B. SOWERBY, junr.

(From the Proceedings of the Zoological Society.)

Conus gracilis (p. 125, Pl. XXIV. fig 6). An elongated Cone, resembling in form *C. aculeiformis* Reeve, &c., but the colouring differs completely from those species it resembles most in shape, being of a rich brown, with a few irregularly-placed whitish patches.

Specimen unique, in the collection of Dr. Prevost.

Conus multilineatus (p. 126, Pl. XXIV. f. 5). A turbinated Cone, bearing most resemblance in marking to *C. ligarius* Reeve, it may however be readily distinguished by its turbinated form and the coronation of the spire.

Specimen unique, in the collection of Dr. Prevost.

Trochus (Polydonta) mirabilis (p. 126, Pl. XXIV. f. 7). A rather solid Trochus, of a fleshy-white colour, with longitudinal reddish-brown "flames." The roughly granular ribs and the deeply excavated suture are its chief characters.

Hab. Molluccas.

Ziziphinus multiliratus (p. 127, Pl. XXIV. f. 10). An abbreviately conical species, of a yellowish-green colour with red "flames," closely encircled with spiral granular ridges.

Var. β , Spiral ridges almost obsolete.

Hab. Cape of Good Hope.

Mitra flexilabris (p. 127, Pl. XXIV. f. 4). A small pyramidal Mitra of a pale yellow, with two orange zones, outer lip inflected above.

Hab. Mauritius. Specimen from the collection of Dr. Prevost.

Mitra induta (p. 128, Pl. XXIV. f. 9). An acuminate fusiform Mitra, quite distinct from any species hitherto described. It makes an addition to those species with dark-brown epidermis, such as *M. orientalis*, *M. nigra*, &c.

Ovulum depresso (p. 128, Pl. XXIV. f. 3). A narrow depressed Ovulum, white, tinged with orange at the extremities.

Hab. North-west Australia.

Admete tabulata (p. 128, Pl. XXIV. f. 3). An Admete of an oblong turreted form; only seven other species of this genus are known, all of which are Northern.

Hab. Arctic Ocean.

Latirus aureo-cinctus (p. 129, Pl. XXIV. f. 2). An elongately turreted shell, with ridges of a golden-yellow colour, the interstices being nearly black with fine whitish threads. It cannot be well compared with any known species.

Myodora rotundata (p. 129, Pl. XXIV. f. 8). A species of rounded form, very inequivalve, and differing from *M. striata* in the shell being rounder, umbones more central, dorsal margin less incurved and more sloping, right valve much deeper, and the ligamentary pit smaller.

Japanese Gastropoda.—A list of the Gastropoda collected in Japanese Seas, by Commander H. C. St. John, R.N.; by Edgar A. Smith, F.Z.S.—(Annals & Mag. Nat. Hist., Aug., 1875, Series IV., Vol. XVI., pp. 103—115).

In this paper, which is a continuation of the one noticed at p. 86, Mr. Smith enumerates forty-five species, of which the following fourteen are described as new:—

<i>Stylopsis rufo-fasciata.</i>	<i>Trochus (Gibbula) yamandus.</i>
<i>Hydrobia plicosa.</i>	<i>T. (G.) japonicus,</i> (A. Ad. MS).
<i>Lacuna unicarinata.</i>	<i>T. (G.) corallinus.</i>
<i>Diala simplex.</i>	<i>T. (G.) redimitus</i> Gld. (described by Smith).
<i>D. tenuis.</i>	
<i>Cylidna pertensis.</i>	<i>Triphoris conspersus</i> (A. Ad. MS).
<i>Buccinum mirandum.</i>	<i>Haminea grisea</i>
<i>Turbo (Collonia) nocturnus</i> Gld.	(described by Smith).

Mollusca Dredged off the Coast of New England in 1874.—Brief contributions to Zoölogy from the Museum of Yale College, No. xxxiii ; Results of Dredging Expeditions off the New England Coast in 1874, By A. E. Verrill.—Amer. Journ. of Sci. & Arts, July, 1875, Third Series, Vol. X. No. 55, pp. 36—43.

In this article is given a brief summary of the results of the operations in connection with the United States Fish Commission, located during the summer of 1874 at Noank, Connecticut, on Fisher's Island Sound, and close to the eastern end of Long Island Sound. More than 180 dredgings were made and recorded by the naturalists attached to the Commission, besides numerous independent and private ones. Lists of those species of *Arcicrida*, *Crustacea*, *Annelida*, *Bivalvia*, *Gephreata*, *Turbellaria*, *Gastropoda*, *Lamellibranchiata*, *Tunicata*, *Bryozoa*, *Echinodermata*, *Acoelomata*, and *Anthozoa*, which are now recorded for the first time from the southern coasts of New England, are given. More complete lists of the marine fauna of the coast have been given by the author in the "Report on the Marine Invertebrates of Southern New England," forming the appendix of the First Report of the U. S. Commissioner of Fish and Fisheries, 1874 ; and also published in a separate form.

The following are the lists of Gastropoda, Lamellibranchiata, and Tunicata ; the few species marked (*) not being new to the fauna, have been introduced in order to confirm the localities or to correct the nomenclature :—

- * *Spirula Greenlandica*, Block Island Sound, 17—24 fathoms.
- Velutina levigata*, off Watch Hill, 18—20 fathoms.
- * *Stylifer Stimpsoni* Verrill, Block Island Sound, 6—15 fms.
- * *Tentacella marmorea* Carpenter, (*Chiton marmoreus* Gould), off Block Island.

Philine quadrata, off Montauk Point, 20—25 fathoms, sand.
Montagut Bostoniensis (Couthouy, sp.), south of Fisher's Island, 32 fathoms, and off Montauk Point.

Embletonia fuscula Gould, also var. *remigata* and var. *lanceolata* Gould ; occurs of all shades of colour from pale flesh-colour to dusky brown. Piles at Noank, common on hydroids.

Doto formosa, Verrill, sp. nov. [described in a note at the foot of page 41], off Point Judith, 10—14 fathoms.

Idalia modesta Verrill, sp. nov. [also described in note to page 41], off west end of Fisher's Island, on sandy and muddy bottom ; Block Island Sound, 17—24 fathoms, north of Little Gull Island, 40 fathoms.

Entalis striolata Stimpson, off Block Island, 20—25 fathoms

Thracia myopsis, west of Fisher's Island, 7—9 fathoms.

Amraecium glabrum Verrill, off Block Island.

REPRINTS.

CRITICAL EXAMINATION OF CERTAIN SPECIES
OF THE AMERICAN CONTINENT AND THE WEST
INDIES, DESCRIBED AS BELONGING TO *HELICINA*
IN LOVELL REEVE'S *CONCHOLOGIA ICONICA*.

By T. BLAND.

[Abridged translation from the Journal de Conchyliologie, by C. P. GLOYNE.]

The genus *Helicina* as understood by Reeve includes *Lucidella*, *Trochatella*, *Helicina*, *Schasicilia*, and *Alcadia* or other authors.

The number of errors in Reeve's Monograph is truly astonishing. A mere compiler, totally ignorant of the subject, could have avoided the greater part of them with a little care. Some examples will be given:—

Helicina Bayamensis and *Bastidiana* are considered as separate species under the names of *H. Bayamensis* and *Bastidiana*; Poey, the author of these two names, has himself acknowledged that the second is only a variety of the first.

H. Catalinensis, so called from the locality Catalina in Cuba, is called *H. Catiliniana* as if it were dedicated to one Mr. Catilini, and Pfeiffer's original description is given in the synonymy, and stated to be from Blainville's Malacology, instead of the Malakozoologische Blätter. [Doubtless Reeve saw "Mal. Bl." and made a guess at the meaning of the abbreviation].

H. littorioela Gundlach, from Baracoa, Cuba, with the figures of some other species, is mentioned as *H. littoralis* of Baraccas.

H. nuda Arango, is figured under the name of *H. Nodæ* Gundlach, and with the habitat "Arango." [M. Crosse pleasantly remarks in a foot note that this is not taking the Piraeus for a man, but a man for the Piraeus].

H. arenicola Morelet, of Yucatan, is attributed to one Morton, whoever he may be, and is wrongly stated to come from Cuba.

H. orbiculata Say, is attributed to Sowerby.

The errors of habitat are quite unpardonable. The following are corrections, Reeve's wrong locality being given first and the right one afterwards:—

H. virginea Lea, Cuba, should be Haiti. *H. minima* Orb., St. Thomas, Cuba and Bahamas. *H. platycheila* Muhl., Cuba and Martinique, Martinique only. *H. substriata* Gray, Cuba, Barbadoes. *H. Chittyana* Pfr., Cuba, Jamaica. *H. rugosa* Pfr., Island of Trinidad, Trinidad in Cuba. *H. vernalis* Mor. Cuba, Guatemala.

Some species are represented by completely wrong figures :—

H. conoides Pfr., of Barbadoes, is represented by the figure of a totally different species, probably Cuban. Fig. 260 of Pl. XXIV. said to be *H. occulta* Sowerby [by mistake for Say], is totally unlike the shell. It is said to be from New York, a part of the United States where no *Helicina* have ever been found.

Alcadia Brownii Gray—*A. hirsuta* and *Hollandi* are placed in the synonymy; they are in fact distinct species.

H. Briareus Poey; fig. 12b represents the species exactly, but 12a is *H. ciliata*, a distinct species.

H. intusplacata Pfr. [habitat unknown] probably redescribed by Pfeiffer as *H. Smithiana* from Haiti.

Trochatella virginea Lea. The operculum figured as that of this shell is that of *T. epima* Shuttleworth. The shell is from Haiti, not from Cuba as stated.

T. opima Shuttleworth; fig. 102a does not represent this species but *T. opima* Pfr., a synonym of *H. pulchella* Gray, var. *nobilis* C. B. Adams. Fig. 102b is also wrong, it may be a variety of *H. Chittiana* Pfr., or a small *T. Tunkervillei*.

T. pulchella Gray; *T. dilatata* Poey should not be in the synonymy.

Helicina festa Gundlach; as this was only a manuscript name it must give place to Poey's name of *rubromarginata*. *H. rubromarginata* is correctly figured, but the form called *H. festa* is more like *H. jucunda* Gundlach.

H. erythraea Wright; only a MS. name, must yield to *H. rubella* Wright.

H. turbinata Wiegmann; the shell figured under this name is certainly *H. Zephyrina* Duclos. Reeve puts in the synonymy *H. "Brandtii"* [he means *Berendti*] described by Pfeiffer as intermediate between *H. turbinata* and *Zephyrina*.

H. Zephyrina Duclos; Reeve places in the synonymy *H. tropica* Chem. and *H. Arneliana* Sowb. *H. tropica* is quite a different species, and *Arneliana* is one of its synonyms.

H. tridens Shuttleworth, MS. only; probably the shell described by Pfeiffer as *Lucidella nana*.

H. alta Sowb.; this species is described as from Porto Rico, it is nothing but *H. trochulina* Orb., which is found both there and in Cuba.

H. spectabilis Gundl. and *H. polychroa* Pfr. MS. These are given as distinct species; the latter is really a var. *minor* of the former.

H. castanea Guilding; this species was briefly described and figured by Sowerby in the first monograph of the Thesaurus. No authority is known for attaching Guilding's name to it; probably = *H. subfusca* Menke.

H. fasciata Lamarck; the shell figured under this name, said to be from Guadeloupe, is *H. picta* Fér. Lamarck gave Porto Rico as the habitat of his species, and it has since only been found there and in Vieque and St. John's. Shuttleworth states that he has received *H. fasciata* from Guadeloupe, Martinique, and St. Kitts, but the species of those islands is *H. picta*. Pfeiffer redescribed the species, by error, under the name of *H. phasianella* Sowb., in sched.

H. Zoa Pfr., MS. Stated to be from Cuba, seems to be *H. Zoa* Pfr. (Mal. Blätter, 1865) from Gilolo, Moluccas.

H. subovalis Sowb. Said to be Jamaican, probably a mere var. of *H. neritella* Lam. Cannot be Jamaican. [We do not understand this last remark; *H. neritella* is a well known Jamaica shell, we have ourselves collected it there in abundance].

[Altogether Mr. Bland's criticisms seem to bear out the description of the Iconica and Thesaurus given by Crosse—"not scientific works of authority, but collections of more or less well made images."—Journ. de Conchyl. Vol. XVIII. p. 259.]

Remarks in brackets are by the translator.

DESCRIPTION OF A NEW SPECIES OF CONUS.

By EDGAR A. SMITH, F.Z.S.

Zoological Department, British Museum.



Conus Traversianus.

Testa elongata, inverse anguste conica, lateribus fere rectis, levissime convexis, superne aliquanto acute angulata; spira breviuscula, concava, anfractibus 10? (apice abrupto) constituta, pallide rosacea; anfractus reliqui & superne leviter excavati, liris paucis incrementique lineis arcuatis ornati, ad suturam subprofundam rufo alboque articulatim notati; anfr. ultimus sulcis transversis aliquanto distantibus, superne fere obsoletis, inferne profundioribus et confertioribus insculptus, dilute rosaceus, fasciis duabus obscuris aurantio-rufis (altera medium supra, altera infra) cinctus, et inter sulcis lineis albo rufoque articulatis ornatus; apertura linearis, angusta, ad basim leviter dilatata, intus rosacea.

Longit. 43 millim. Diam. ad angulum 17.

Shell elongate, inversely narrowly conical, with the lateral outlines nearly rectilinear, only the slightest convex, and rather sharply angulated above; the spire is shortish, concave, probably consists of about 10? whorls (the apex is broken off) and is of a pale pink colour; the four remaining whorls are slightly excavated above and ornamented with a few spiral lirations and the arcuate lines of growth and are articulately dotted at the sutures, which is deepish, with red and white; the last whorl is sculptured with somewhat distant transverse sulcations, of which the upper ones are almost obsolete, and those on the lower portion of the whorl are deeper and closer together than those above, it is of a pale pink colour encircled with two broad orange-red bands, the one above and the other below the middle, and between the sulcations it is ornamented with lines articulated with red and white; the aperture is narrow, linear, and slightly widened at the base, and of a rose colour within.

Hab. ?

This species is well distinguished by its narrow form, in conjunction with the style of coloration. The two orange-red bands around the last whorl (of which the upper is rather the narrower) are somewhat interrupted here and there, and the red dots which together with the milk-white ones which form the articulated transverse lines are very small.

It belongs to that section of the Genus *Conus* which includes certain species which are characterized by their regular straight conical outlines, and a rather short and generally slightly concave spire. To this group, of which *C. generalis*, *C. Malaccanus*, *C. planorbis*, *C. centurio*, and *C. ermineus* are very characteristic examples, Mööch has given the name *Rhizoconus*.

The spiral articulated lines are very similar to those which occur in the typical form of *C. mindanensis*. The angle of the last whorl is articulately dotted with short orange-red and white lines (about one line in length) which give the angle the aspect of a faint coronation or more correctly undulation.

I feel much pleasure in associating with this species the name of a young and clever student in this branch of Zoology.

A LIST OF THE LAND AND FRESHWATER SHELLS
OF TRINIDAD, SHOWING THE DISTRIBUTION OF
THE SPECIES.

By R. J. LECHMERE GUPPY, F.L.S., F.G.S., C.M.Z.S., &c.

Names.	Sth. America and Central America			Remarks.
	Antilles.			
<i>Glandina minutissima</i> <i>G.</i>	...	...	...	Probably allied to <i>A. iota</i> Adams, Jamaica.
<i>Spiraxis simplex</i> <i>G.</i>	...	...	...
<i>Stenogyra octona</i> <i>Ch.</i>	x	*		
,, <i>caracasensis</i> <i>Reeve.</i>	x	*		
,, <i>plicatella</i> <i>G.</i>	x	*		
<i>Cionella lamellata</i> <i>P. & M.</i>	x	*		
<i>Zonites Guildingi</i> <i>Bland.</i>	x	...		
,, <i>implicans</i> <i>G.</i>	...	...
,, <i>umbratilis</i> <i>G.</i>	...	...
<i>Guppya vacans</i> <i>G.</i>	x	...		
<i>Macrocyclis alicea</i> <i>G.</i>	...	...
<i>Helix coactiliata</i> <i>Fér.</i>	x	...		
,, <i>bactricola</i> <i>G.</i>	x	...		
,, <i>ierensis</i> <i>G.</i>	...	*		
,, <i>cæca</i> <i>G.</i>	x	..		
<i>Bulimus oblongus</i> <i>Müll.</i>	x	*		
,, <i>auris-sciuri</i> <i>G.</i>	...	...		A form of <i>B. glaber</i> , found also in Tobago.
,, <i>pilosus</i> <i>G.</i>	...	...		Allied to <i>B. constrictus</i> Pf.
<i>Bulimulus aureolus</i> <i>G.</i>	...	...		Allied to <i>B. Rawsonii</i> , Tobago.
,, <i>vincentinus</i> <i>Pfr.</i>	x	...		
,, <i>tenuissimus</i> <i>Fér.</i>	x	*		
<i>Orthalicus undatus</i> <i>Brug.</i>	x	*		
<i>Cylindrella trinitaria</i> <i>Pf.</i>	x	...		
<i>Pupa uvulifera</i> <i>G.</i>	...	...
,, <i>bicolor</i> <i>Hutton.</i>	...	*		East Indian.
,, <i>eyriesi</i> <i>Drouët</i>	x	*		

Names.	Sth. America and Central America. Antilles.	Remarks.
<i>Streptaxis deformis</i> <i>Fér.</i>	x	
<i>Simpulopsis corrugatus</i> <i>G.</i>	...	
<i>Succinea approximans</i> <i>Sh.</i>	x	x
<i>Omalonyx felina</i> <i>G.</i>	...	
<i>Veronicella laevis</i> <i>Fér.</i>	x	x
<i>Melampus coffea</i> <i>L.</i>	x	x
" <i>pusillus</i> <i>Gmel.</i>	x	x
<i>Pedipes mirabilis</i> <i>Meg.</i>	x	x
<i>Ancylus textilis</i> <i>G.</i>	...	
<i>Gundlachia crepidulina</i> <i>G.</i>	...	
<i>Planorbis Terverianus</i> <i>Orb.</i>	...	x
" <i>meniscus</i> <i>G.</i>	...	
<i>Physa rivalis</i> <i>M.</i> & <i>R.</i>	*	*
<i>Amnicola spiralis</i> <i>G.</i>	...	?
<i>Marisa cornuarietis</i> <i>L.</i>		= <i>Amn. candeana</i> <i>Orb.</i> , Cuba and Jamaica
<i>Ampullaria urceus</i> <i>Müll.</i>	x	x
" <i>effusa</i> <i>Müll.</i>	x	x
" <i>crocostoma</i> <i>Phil.</i>	x	x
<i>Cyclotus translucidus</i> <i>Sow.</i>	x	
<i>Grenadensis</i> <i>Shuttle.</i>	...	
<i>Diplommatina Huttoni</i> <i>Pf.</i>	...	
<i>Truncatella pulchella</i> <i>Pf.</i>	x	x
<i>Taheita reclusa</i> <i>G.</i>	...	
<i>Cistula ariensis</i> <i>G.</i>	...	
<i>Helicina barbata</i> <i>G.</i>	...	
" <i>nemoralis</i> <i>G.</i>	...	
" <i>lamellosa</i> <i>G.</i>	*	
" <i>ignicoma</i> <i>G.</i>	...	
<i>Neritina microstoma</i> <i>Orb.</i>	...	
<i>Cyclas incurva</i> <i>G.</i>	*	x
" <i>punctifera</i> <i>G.</i>	...	
<i>Anodon leotaudi</i> <i>G.</i>	...	

Doubtful Species.

Antonoe riparia? = *Auricula pellucens*.

Stenogyra coronata *G.*

Pupa auriformis *G.*

For a fuller account of the distribution of the land and freshwater mollusca of Trinidad see Proc. Zool. Soc., 1875, p. 318.

A CATALOGUE OF THE MOLLUSCA FOUND IN
THE NEIGHBOURHOOD OF HEIDELBERG, GRAND
DUCHY OF BADEN.

By JOHN E. DANIEL.

Upwards of fifty years ago a friend told me as a boy of few years to find him a snail that went the wrong way, meaning a sinistral form, and the hecatombs that I slaughtered in this search is something awful to think of, now that I am a grey-headed old man; but always fond as I was of collecting objects of Natural History, this may have laid the foundation of what became at one period of my life a perfect mania, and of all branches of Conchology the land and freshwater shells have had a special hold on me; and although I cannot for one moment claim an accurate or scientific knowledge, for some years I was an indefatigable collector, and when I went to reside in Germany for a period it absorbed my whole attention, from the fact that I had little else to occupy my mind. I fear that the following catalogue may be to a great extent imperfect, more especially as it is now fourteen or fifteen years since my return to England, and I have mislaid, lost, and given away many of my notes and specimens, nevertheless I hope it may be of some slight use and interest to those readers of the "Q. J. C." who may chance to visit this remarkably beautiful and interesting district. At the time I laboured under many difficulties, I did not speak the language, I was a complete neophyte in the science, having only collected previously between Wareham and Weymouth, in Dorsetshire, I was unacquainted with any cabinet or collector,

except Mr. R. Damon of Weymouth, and in Heidelberg there was no one who took the slightest interest in the matter at that time, with the exception of Mr. Lömmel, of the Sandgasse, who dealt in minerals and fossils, but in working up the Ferns and Flora I soon discovered how many new species there were to my eyes, and I had the honour and pleasure of adding several new species to the known fauna of the district, and also of turning the attention of several students, native, English, and American, to the pursuit.

1. *Limax agrestis*, L.—Calls for no special note.
2. *L. brunneus*, Drap.—Mr. Jeffreys and M. Moquin-Tandon are now I believe fully alive to the fact of this very pretty animal being a good and distinct species; it is never found anywhere but in swampy situations; it never attains to the size of the previous species; it is a deep rich brown colour, and the slime or mucus is colourless and not so viscid as many of its congeners.
3. *L. tenellus*, Müller.—Another small species, whitish-gray in colour, something like *L. agrestis*, but here again the secretion is colourless. If I am correct in the name of this slug the only habitat I remember to have seen it in is a ditch or small stream running by the side of what is called the "rent tower," (gesprengte Thurm) in the Castle.
4. *L. cinereo-niger*, Nilsson.—This is a grand animal unknown in Britain; it is the largest slug I know; it lives in the forests, and is always to be found wandering about in damp weather, provided it is moderately warm; I have seen them when stretched to their full extent upwards of seven inches long, in colour bright polished black, with a broad white stripe running down the entire length of the belly, with a margin of black on each side, occasionally, but rarely, pale dusky olive green, and white varieties are met with. The lower portion of the keel is sharply keeled, shell in shape somewhat similar to *L. flavus*, thin, brittle, and when fresh almost transparent.
5. *L. maximus*, L.—Everywhere abundant in the open country, especially on old walls; this species is more nocturnal in its habits than the last, and like the pretty *L. arborum*, suspend themselves heads downwards

when they are engaged in the important office of propagating their species; All the specimens of the district were much more beautifully and distinctly marked than any specimens I have met with in England, and the shell was more frequently distorted or hypertrophied than I have met with elsewhere, possibly from being on the sandstone.

6. *L. arborum* Bouchard-Chantereux.
7. *L. flavus* L.
8. *L. carinatus* Leach.—Apparently a variety of our English species, slightly darker in colour and the spots more distinct.
9. *Arion ater* L.—Everywhere and in every shade of colour, from black to white and orange.
10. *A. hortensis* Fer.—Not abundant.
11. *A. albus* L.—A pretty little species and distinct, under moss and dead leaves in woods, &c.
12. *Testacella haliotoidea* Drap.—I have never found this species, and introduce it on the strength of a single example found in the Castle gardens by an Englishman, and presented to, and preserved in the Museum Lömmel.
13. *Vitrina elongata* Drap.—A well-marked species and very abundant in damp situations, more especially in winter and autumn.
14. *V. diaphana* Drap.—It is difficult to me to describe the difference between this species and *V. pellucida*, but it is slightly more globular, and is gregarious, the one can withdraw its body entirely within the shell, which our species in England cannot: habitats the same as last, especially in the Castle gardens.
15. *V. pellucida* Mull.—Not by any means common.
16. *Daudebardia brevipes* Drap.—Great was my delight, as one day when examining the contents of my collecting box I found a solitary example of this rare, pretty and interesting animal; when I first picked it up I was under the shade of the trees on the summit of the Heilegenberg, and I imagined it was a variety of *V. elongata*, but when I had extracted the animal and saw the umbilicus, I knew how great a treasure I

had acquired. Afterwards I found other stations between the Castle and Wolfsbrunnen, and in the Philosophenweg and elsewhere, always under stones or moss. It is not common and requires diligent searching.

17. **D. rufa** Drap.—Said to have been found, but I have never seen a specimen and doubt it.
18. **Helix nemoralis** L.—In many varieties and colours.
19. **H. hortensis** Mull.—In many varieties and colours.
20. **H. hybrida** Poiret.—Not so common as the two preceding. I see in a note “ rare, with rose-coloured lip.”
21. **H. sylvatica** Drap.—Is not found in the immediate neighbourhood, but between that and Carlsruhe.
22. **H. pomatia** L.—Everywhere common; in fact it takes the place of our *H. aspersa*, which is nowhere to be found. It is reported to be occasionally met with sinistral and scalariform. It is the only species brought into market for consumption, and then only during the Lenten season, at the same time as frogs (*Rana cedulis*).
I never could summon courage to taste either, although they looked tempting enough.
23. **H. fruticum** Mull.—The shell is diaphanous, showing the speckled flesh of the animal through, umbilicated, of a white, pale sulphur, ochreous, or chocolate colour; and about Mannheim with one band, rarely two bands. Common on trees and shrubs.
24. **H. strigella** Drap.—Common, has a large umbilicus.
25. **H. villosa** Drap.—This striking species is not common about Heidelberg, but in the forests by the side of the Rhine is abundant.
26. **H. incarnata** Mull.—Common, narrow umbilicus.
(*H. rufescens*, Pennant.)
27. **H. circinata** var. **montana** Studer.—Heidelberg and Saarbruck.
28. **H. hispida** L.—Most abundant, and a variety “*depilata*” rare at Mannheim.
29. **H. personata** Lam.—Is to be found in many localities, under stones and dead leaves in the forest. To me it is a most interesting species, not only from the curious formation of the shell, from which its specific name of “masked” is taken, but also from its being almost

identical with the American *H. clausa* of Say, a lovely little round shell, thickly covered with closely set persistent spines or hairs; colour rich chestnut.

30. *H. obvoluta* *Mull.*—Everywhere most abundant.
31. *H. ericetorum* *Mull.*—Examples of this species, of a large size, in a sandpit on the road to Kirsheim, and a variety in the Castle gardens, &c.
32. *H. candidula* *Studer.*—This is very much like a very small form of *Helix virgata*, but differs from it—the animal not being so dark, and the lip of the shell is white. Some distance from Heidelberg, as Langenbrücken, &c.
33. *H. aculeata* *Mull.*—On alder trees in the Castle gardens, and under fallen leaves.
34. *H. fulva* *Mull.*—Langenbrücken.
35. *H. pulchella* *Mull.*—and its var. “*costata*” common.
36. *H. lapicida* *L.*—Common.
37. *H. rotundata* *Mull.*—Common.
38. *H. pygmæa* *Drap.*—Common in usual situations.
39. *H. sericea* *Mull.*—Carlsruhe.
40. *Zonites cellararius* *Mull.*—Common.
41. *Z. glabra* *Studer.*—Forests, &c.
42. *Z. lucida* *Drap.*—Common.
43. *Z. radiatulus* *Alder.*—In wet moss.
44. *Z. nitidulus* *Drap.*—Not uncommon.
45. *Z. crystallinus* *Mull.*—Not uncommon.
46. *Balia fragilis* *F. & H.*—Castle gardens, &c.
47. *Succinea putris* *L.*—Common.
48. *S. Pfeifferi* *Rossmassler.*—Between Neckarsteinach and Schönau.
49. *S. oblonga* *Drap.*—Haarlass, and also abundant at Biebrich.
50. *Bulimus detritus* *Mull.*—(*B. radiata* *Brus.*)—This typical and striking white shell is everywhere abundant. Occasionally found with a few dark stripes, and more rarely an elongated form especially by the Kaiserthal, Freiburg. It was once introduced into this country, near Canterbury, but I have never heard whether it prospered.

51. **B. montanus** Drap.—Speyerhof, Heidelberg, and forests on the banks of the Rhine, near Mannheim.
52. **B. obscurus** Mull.—Abundant.
53. **Achatina acicula** Mull.—Haarlass, Durlach, &c. Many diligent collectors often complain that they can find no living specimens of this most elegant snail, it is an entirely subterraneous dweller, and must be searched for under large flat stones, at the roots of plants, and in the fissures of shale rocks. At Haarlass I found it in company with *Vertigo minutissima*.
54. **Zua lubrica** Mull.—Everywhere abundant and has existed many ages, as may be seen in examining the lowest portions of the Löess.
55. **Z. nitens** Koekeb.—(See Albers Heliceen, 2nd Ed., 1860, p. 256.) If a species, which I doubt, it is smaller and has a white lip; according to my notes, from Sweden, Baden, and Redhill, Surrey.
56. **Pupa frumentum** Drap.—Haarlass, Weinheim, Durlach, &c. This species at first sight might be mistaken for *P. secale*, but is larger, the shell more polished, and the peristome not contracted.
57. **P. secale** Drap.—Handschuhsheim, &c.
58. **P. marginata** Drap.—Common; the edentulous variety is said to be found in some parts of the Black Forest.
59. **P. quadridens** Drap.=(*B. quadridens* Mull.)—Langenbrücken.
60. **P. avena** Drap.—Carlsruhe.
61. **P. umbilicata** Drap.—The locality for this I am doubtful about.
62. **Vertigo sexdentata** Flem.=(*V. substriata*, Jeffreys.)—Engelswiese, Handschuhsheim, and Siebenmühlthal.
64. **V. edentula** Drap.—Castlegardens.
65. **V. minutissima** Hartm.—Abundant, but local; Haarlass, Friedrichsfelt, Biebrich, &c.
66. **V. pygmæa** Drap.—Common.
67. **V. palustris** Jeff.=(*V. antivertigo*, Drap.)—Common.
68. **V. alpestris** Albers.—Wolfsbrunnen, rare.
69. **V. Moulinsiana** Dupuy.—Siebenmühlthal and near Frankfort. The latter locality by Mr. Heynemann of that city.

70. **V. pusilla** *Mull.*—Amongst the rejectamenta on the banks of the Neckar, dead; Rühe and Weisenthal by Wiesbaden.
78. **V. Venetziæ** *F. & H.*—(V. angustior, *Jeffr.*)—Wiesenthal by Wiesbaden, in moss fringing a small stream running through the meadows.
72. **Clausilia biplicata** *Mont.*—One of the commonest species.
73. **C. bidens** *Drap.*—(C. laminata, *Mont.*)—By no means abundant, the variety “*albida*” comparatively not uncommon.
74. **C. Itala** var. **Braunii** *Charp.*—Abundant on the Anlage and Weinheim. Said to have been a foreign introduction, but for which I can see no reason, as it is widely distributed.
75. **C. nigricans** *M. & R.*—(C. rugosa, *Drap.*)—Haarlass, Wolfsbrünnen, &c.
76. **C. parvula** *Studer.*—Everywhere abundant.
77. **Cyclostoma elegans** *Mull.*—Dossenheim, and Handschuhsheim.
78. **Acme lineata** *Drap.*—Near Carlsruhe.
79. **Pomatias maculatum** *Studer.*—Klein Reus.
80. **Carychium minimum** *Mull.*—Ubiquitous.
81. **Neritina fluviatilis** *L.*—Neckar.
82. **Paludina conlecta** *Millet.*—Mannheim and Neckarhau.
83. **Bythinia tentaculata** *L.*—Ubiquitous, the variety “*producta*” in ditches at Ladenberg, Sandhausen, &c.
84. **Limnæa stagnalis** *L.*—Common.
85. **L. palustris** *Mull.*—Between Schwetzingen and Neckarhau.
86. **L. peregra** *Mull.*—Handschuhsheim.
87. **L. vulgaris** *C. Pfeiff.*—Castle gardens.
88. **L. minutus** *Drap.*—Neckar.
89. **L. auricularia** *L.*—Neckar.
90. **Pisidium amnicum** *Mull.*—Neckar.
91. **P. obtusale** *Pfeiff.*—Pond on road to Kirsheim.
92. **P. pusillum** *Gmelin.*—Neckar and Castle gardens.
93. **P. pulchellum** *Jenyns.*—Neckar, Canal at Ladenburg.
94. **Cyclas rivicola** *Leach.*—Harbour on the Neckar.
95. **C. cornea** *L.*—Neckar and Carlsruhe.

96. *C. cornea* var. *nucleus* *Studer*.—Ladenburg.
97. *C. solida*.—The Rhine, rare.
98. *C. calyculata* *Drap.*—Various ponds.
99. *Unio pictorum* *L.*—Neckar.
100. *U. tumidus* *Phil.*—Neckar.
101. *U. batavus*.—Neckar.
102. *U. margaritiferus* *L.*—Schönau.
103. *Anodonta cygnæa* *L.*—Neckar.
104. *A. anatina* *L.*—Neckar.
105. *Dreissena polymorpha* *Pallas*.—Neckar and Rhine.

In making out the foregoing list, I fear many will object that it is not drawn out on any of the approved scientific works, but the fact is I took them as I came across my notes, and as the specimens lay in my cabinet. So far as it goes, I can vouch for the correctness, having found specimens of all myself, except *Testacella* and *Cyclas solida*. This last is identical with samples sent me "inter alia" from the River Don, Canada. This is as interesting a fact as the *Helix personata* and *H. clausa*, Say, showing the links which must at one time have joined these now widely separated continents. In the geological formation, locally called Löess, and on what is now nearly on a level with the bed of the Neckar, are to be found examples of *Helix hispida*, called by Paleontologists *H. plebeia* and *Zua tubria*, the latter occasionally as bright and dark-coloured as recent living shells, and over these again in another stratum is *Unio batavus*; and I have seen in the Solenhofen stone *Dreissena polymorpha* embedded. In conclusion, I think it probable that *Helix bidens* and *H. naticoides* may be found, the one being at Dresden and the other in Switzerland.

**DESCRIPTIONS OF SOME NEW SPECIES OF LAND
AND FRESHWATER SHELLS, AND REMARKS
ON OTHER SPECIES FOUND IN JAPAN.**

BY EDGAR A. SMITH, F.Z.S.

Zoological Department, British Museum.

During the past year a small collection of terrestrial and freshwater shells was kindly presented to the British Museum by C. W. Goodwin, Esq., by whom they were collected chiefly in the

neighbourhood of Yokohama and Kobe. As precise information is attached to several of them, it adds very much to their value, and may be sufficiently interesting to engage the attention of Conchologists, to whom such information is always most acceptable from collectors.

The following is the complete list :—

1. *Helix peliomphala* Pfeiffer.
2. *H. quæsita* Deshayes.
3. *H. japonica* Pf.—“ Pretty common.”
4. *H. similaris* Féر.—“ Found only in one or two localities.”
5. *H. Sieboldiana* Pfr.—“ Found in caves and in the earth ; only now and then found crawling about.” One specimen of this species survived the long journey to England and I have had it living since May, 1875, in a glass jar with earth at the bottom of it, and in captivity it still retains the habit of burrowing. The animal is of a yellowish waxy colour, with a long narrow foot, tapering posteriorly, and rather elongate tentacles, and is indifferent as to its food, displaying however a decided partiality for cucumber.

The five preceding species were all found in the neighbourhood of Yokohama.

6. *H. Mackensii* Ad. & Rue.—Occurred at Kobe.
7. *H. conospira* (Pfr.) Martens.—“ Very rare, only four specimens taken in my garden,” Yokohama ; the shell which I refer to this species agrees exactly with the figure given by Martens in the “ Preussische Expedition nach Ost-Asien,” pl. 14, fig. 7. The dimensions are 8 mill. in its greatest breadth, 7 in the smallest, and 7 in height.

7. *Helix Goodwinii* sp. nov.

Testa depresso-conica, aperte sed subanguste umbilicata, tenuis, pallide cornea, translucida, incrementi lineis obliquis tenuiter striata, et striis spiralibus minutis (fere obsoletis) insculpta ; spira leviter convexe conica ; anfractus 5½—6 convexiusculi, sutura simplici bene impressa sejuncti, ultimus medio indistincte obtuse angulatus, versus labrum, paulum descendens ; apertura

obliqua, rotundato-ligata; peristoma ubique (superne excepto) leviter expansum, tenue, marginibus aliquanto conniventibus, columellari dilatato albo.

Diam. maj. 11½ mill., min. 9½, alt. 7½.

Shell depressly conical, openly but rather narrowly umbilicated, thin pale horn-colour, semi transparent, finely striated by the oblique lines of growth, and sculptured with minute (almost obsolete) spiral striation; spire slightly conoidly conical; whorls 5½–6 rather convex, separated by a simple well-impressed suture; last whorl indistinctly obtusely angulated round the middle, slightly descending near the lip; aperture oblique, roundly-ovate; peristome everywhere slightly expanded except superiorly, thin, with the extremities somewhat inclining to each other, in the columellar region white and expanded.

Hab. Kobe.

The nearest ally of this species is the preceding (*II. conospira*). From it, however it differs in its less elevated spire, rather less convex whorls, its slightly more open umbilicus and its larger size. The spiral striation is very minute, and indeed scarcely observable under a simple lens. The angulation of the body whorl is very faint, but most apparent on that part of the whorl nearest the upper termination of the peristome, the columellar portion of which is considerably expanded at the point of juncture with the last whorl, and is of a white colour.

9. *Clausilia bilabrata* sp. nov.

Texta vix rima, dilute fuscescens, epidermide pallide olivaceo-fusca induata, oblique tenuiter striata, clavate fusiformis, spira sursum—?; anfractus circiter 12? (apice abrupto) parum convexiusculi, sutura simplici sejuncti; anfr. ultimus quam penult. paulo angustior, versus labrum aliquanto fortius striatus; apertura subobliqua, ovato-pyriformis intus dilute sordide fuscescens; plica parietalis supera parviuscula, verticalis, marginem attingens, infera longe intus sita vix conspicua; plica subcolumellaris distincta ad marginem producta; plicæ palatales duæ, supera elongata, suturæ parallelæ, infera brevis, et transversa; peristoma continuum, ubique breviter expansum et reflexum, extra bimarginatum.

Long. anfr. 7 reliquorum 21 mill., Diam. anfr. penult. 5½.

Long. tota probabiliter circiter 28.

Shell scarcely rimate, thick, pale brownish clothed with a pale, olive-brown epidermis, obliquely finely striated, clavately fusiform with the spire above—? (broken off); whorls about 12 slightly convex, divided by a simple suture; the last whorl a little narrower than the penultimate, towards the lip a trifle more strongly striated; the aperture somewhat oblique, ovately pear shaped, pale dirty brownish within; the upper parietal plication smallish, vertical, reaching the margin of the peristome, the lower one scarcely observable situated far within the aperture; the subcolumellar fold distinct produced to the edge; the palatal plicæ two in number, the upper elongate, parallel with the suture, the lower short, at right angles to the other: the peristome continuous, everywhere slightly expanded and reflexed, double-edged exteriorly.

Hab. Kobe.

This species is remarkable for its solidity, the faintness of the oblique striation and the double edge to the peristome. The most nearly allied form is *Cl. Buschii*, Küster, from which it differs in being considerably larger and stouter, in the proportion of the whorls and in the size of the aperture. In *Cl. Buschii* the aperture about equals in length the part of the body whorl above it, whereas in the present species it considerably exceeds it, and in the former species the body-whorl is much longer than the penultimate whilst in the latter it just equals it, and it is to be observed that the increase of the whorls is less rapid in *bilabrata* than in *Buschii*. The armature of the mouth is almost similar, with the exception of the inferior parietal plication being less conspicuous, and situated farther within the aperture. The double edge of the peristome, which is only visible when the shell is viewed from behind, is due no doubt to age, a simple lip being first formed and subsequently strengthened by a second callous deposit. The peristome of *Cl. Buschii* has been described as “*breviter solutum*” which term cannot be aptly applied to that of *bilabrata* as the callous margin rests on the body-whorl.

Owing to the thickness of the shell, the palatal plicæ are not very distinct but they appear to be two in number, the upper one

elongate and parallel with the suture, and the lower short and almost at right angles to it.

10. *Clausilia Kobensis* sp. nov.

Testa subclavata fusiformis, spira sursum sensim attenuata, ad apicem obtusiuscula, pallide fuscescens, oblique tenuiter striata; anfractus 12 mediocriter convexi, lente accrescentes, sutura simplici impressa sejuncti; anfr. ultimus quam penult. paulo angustior; apertura oblique subpyriformis: plicae parietales valide divergentes, supera marginem attingens, infera prominens, margini haud juncta; plica subcolumellaris distincta ad labrum producta: plicae palatales duo, supera elongata suture parallela, infera longe brevior leviter divergens; peristoma continuum, album, ubique (superne excepto) expansum leviterque reflexum.

Long. 32 mill. Diam. anfr. penulti 7.

Shell subclavately fusiform, the spire being gradually attenuated superiorly and obtusish at the apex, of a pale brownish color and obliquely finely striated; whorls 12, moderately convex, slowly increasing and divided by a simple impressed suture: the last whorl a little narrower than the penultimate; the aperture oblique and pear shaped: the parietal plicæ strong and diverging, the upper one reaching the edge of the peristome, the lower one prominent but not joined to the margin; the subcolumellar fold distinct produced to the lip; the palatal plications two in number, the upper elongate, parallel with the suture, the lower much shorter, slightly diverging from one another; the peristome continuous, white everywhere except above, expanded and a little reflexed.

Hab. Kobe.

This species has the general aspect of *C. Fortunei* of Pfeiffer, but differs in the following particulars. The number of whorls is less, the aperture is a trifle smaller, the lower parietal fold is more prominent and transverse, and the subcolumellar plication is strongly developed, whereas in *Cl. Fortunei* it is apparently altogether wanting. Since writing the above description, other specimens in better condition have been presented to the Museum by Mr. Geo. Lewis. These also were found at Kobe, and are clothed with a thin olive epidermis.

11. **Clausilia acutus** Benson.—Two varieties of this species were sent by Mr. Goodwin—one “common at Yokohama” and the other from Kobe. The latter is more slender, consists of 10 whorls, whereas the former has only 9, and the subcolumellar fold in both forms is scarcely perceptible or wanting, whilst in Chinese examples of this species it is usually present.
12. **Cyclotus Fortunei** Pfr.—Kobe.
13. **Cyclophorus Herklotsi** Martens.—Kobe. “Varies much in size.” This species is recorded by its author from Nagasaki and was also found by A. Adams at the island Tsus’sima. This is the first time I believe that it has occurred so far north.
14. **Pupinopsis mindorensis** Ad. & Rve.—Yokohama. It was found by A. Adams also at Tsus’sima, an island off the south-western extremity of Nippon. If *P. Japonica* Martens should prove to be the same as this species (as stated by A. Adams, P.Z.S., 1867) there will be but two species of Japanese Pupinopsis, the second being *P. rufa* Pfr.

15. **Melania Niponica** sp. nov.

Testa subulato-conica, decollata, fusca, anfractus reliqui 3 fere plani, sutura simplici aliquanto obliqua discreti, costis longitudinalibus leviter obliquis circiter 15 et liris spiralibus 3 ad intersectionis locos nodulosis instructi, incrementique lineis tenuibus striati; anf. ultimus infra medium liris spiralibus 2—3 minus aut vix nodosis succintus; apertura mediocris, oblique ovato-pyriformis, ad basim perparum acuminata, intus albo-cerulea; columella superne vix arcuata, inferne mediocriter curvata, callo tenui labro juncta.

*Long. anfr. 3 reliquorum 22 mill. Diam. anfr. ultimi 9;
Apertura longit. 9, Diam. 5½.*

Var.

Testa minor, vel olivacea, vel olivaceo-fusca; anfractus paulo convexiores, costis longitudinalibus conserioribus leviterque arcuatiss, et liris spiralibus 5—7 tenuioribus adque intersectionis locos minus nodulosis instructi.

*Long. anfr. 3 reliquorum 17 mill. Diam. anfr. ultimi 6½;
Apertura longit. 6½, Diam. 4.*

Shell subulately conical, decollated, brown; the 3 remaining whorls almost flat, separated by a simple and somewhat oblique suture, furnished with about 15 longitudinal slightly slanting ribs and 3 spiral lirations which are nodulous at the points of intersection with the ribs, and also striated by the fine lines of growth; the last whorl girded below the middle by 2-3 less or scarcely nodulous spiral lirations; the aperture moderate, obliquely pear-shaped, at the base a very little pointed, of a bluish-white colour within; the columella scarcely arched above, moderately curved below, joined to the outer lip above by a thin callous enamel.

Var.

Shell smaller, either olive or olive-brown; the whorls rather more convex, with the longitudinal ribs closer together and slightly arcuate, and 5-7 spiral lirations more slender and less nodulous at the points of contact.

Hab. Lake Biwa, near Kiyoto.

This is a very distinct species from all others which have hitherto been recorded from Japan. The tubercles at the points of conjunction of the costations and transverse lirations are very conspicuous in the typical form. The costæ are more prominent than the line, indeed the latter are almost obsolete between the longitudinal ribs; but such however is not the case with the two or three which are situated below the middle of the body whorl, these are less nodose or even quite devoid of tubercles and are well developed.

The smaller variety is mainly distinguished by its slightly more convex whorls, and the closer arrangement of the ribs which are obliquely arcuate. I know of no species with which to compare the present form, perhaps *M. Amurensis* of Gerstfeldt offers as much similitude as any, however its much larger size, more turreted whorls and much stronger costations are differences which at once dissociate it from *M. Nipponica*. The figure of *M. Morehii* in Reeve's *Conchol. Icon.* f. 108 represents very fairly the outline of the typical form of this species; the variety is much more slender.

16. *Melania tenuisulcata* Dunker. — "Plentiful in rapid streams and on moist rocks," Yokohama. Three other species have been described which are most

closely related to the present, indeed I am of opinion that they will prove to be synonymous; *M. libertina* described by Gould in the Proceedings of the Boston Society of Natural History for June 1859; *M. Japonica* Reeve, Conchol. Icon. December 1859, and *M. ambidextra* Martens, Malakzool, Blätter 1861. If eventually these forms be united, Gould's name would have to be retained since it has a few months priority to the more characteristic one assigned by Reeve.

17. *Limnæa Japonica* Jay.—“Found in great profusion in the rice fields this spring. I suppose they are second year shells, which have burrowed in the mud all the winter.” This species was described by Jay in the United States Japan Expedition under Commodore Perry in 1856, Vol. II. p. 294, and is badly figured on Plate V. f. 10—12. Martens in the Malakozoologische Blätter 1861, Vol. VII. p. 42, gives a more complete description. Sowerby, in the Conchol. Iconica, has again described this species, but fortunately though unaware of the name *Japonica* having been employed, he has made use of it to designate this species.

The specimens sent by Mr. Goodwin are much larger than that which is figured by Jay; the largest is 29 mill. in length, 20 in its greatest width, and 14 in the smallest; the aperture measures 24 long and 15 broad. Some specimens were found by Mr. Goodwin very abundantly “in a pond which is the feeder of the rice fields at Yokohama.” I believe they are but the younger stages of this species. A remarkable monstrosity has the spire deeply sunken within the body whorl like the Irish *L. involuta* with a very deep sutural canalication; some specimens display distinct malleation, and there is a thin whitish enamel spreading over the columellar portion of the body-whorl.

18. *Limnæa Goodwinii* sp. nov.

Testa subovata, anguste perforata, fusco cincta, parum nitida, spira gradata, mediociter elongata; anfractus 4—4½, convexi, superne rotunde tabulati, sutura profunda impressa sejuncti, incrementi lineis tenuibus et striis minutissimis spiralibus in-

sculpti : apertura ovata, longitudinis teste totius .6 adequans ; columella leviter obliqua, parum arcuata, vixque contorta, superne expansa et reflexa rimam parvam fere tegens.

Long. 7½ mill. Diam. 3½.

Shell subovate, narrowly perforate, brownish horn-colour, a little shining, with the spire gradated, and moderately elongate : whorls 4—4½, convex, roundly tabulated above, divided by a deep impressed suture and sculptured with fine lines of growth and minute spiral striations : the aperture ovate, about equalling ⅔ of the entire length of the shell ; the columella slightly oblique, only a little arched, and scarcely twisted, expanded above and reflexed, almost covering the slight fissure.

Hab. Yokohama. "Abundant on moist rocks in several places on the sea shore or near the sea." (Goodwin.)

This species is somewhat allied to the European *L. truncatula* which has been found in several parts of north-east Asia. However the considerably more elongated spire, the greater number of its whorls, and the much smaller aperture well distinguish it from the present species. As a guide to the form of *L. Goodwini*, I may cite the figure of *L. vitrea* in the Conchol. Iconica pl. 14, fig. 94, which in outline is very like it, but the columella is not so twisted. The whorls are distinctly turreted and separated by a deeply impressed suture. The minute spiral striation is more apparent in some specimens than in others, but at all times it is only observable under a powerful lens.

19. *Planorbis spirillus* Gould!—This is I believe the only species of *Planorbis* which has been as yet recorded from Japan. It is with considerable doubt that I refer the specimens sent by Mr. Goodwin to this species, the reason being that I am uncertain with regard to the meaning "*liris ad quatuor prope aper turam instructa.*" They are concave above and below as described by Gould, more so on the inferior than on the upper surface and the last whorl is faintly obtusely angled, the suture is very deeply impressed and the whorls are very finely striated by the arcuate lines of growth.

20. **Paludina Japonica Martens.**—"Very abundant in the paddy-fields" at Yokohama. Most of the specimens of this species have more or less malleation, one large one having the entire surface strongly indented, the body-whorl almost invariably displays an angulation or obtuse carination around the middle, and sometimes the two keels which encircle the upper whorls are more or less apparent in the last above this central angulation and in one example two or three remote keels are faintly visible below it; the operculum is of a light-brown colour and very concave exteriorly in the nuclear region. In the Cumingian collection there is a single specimen having Japan affixed to it under the name *Vivipara Slateri* Frauenfeld. It is undoubtedly the same as the present species, but I am not aware of Frauenfeld having ever published such a species. *P. malleata* Reeve is closely allied to *Japonica*, differing chiefly from it in having the whorls rather more convex and the spiral carinations almost obsolete; however they are just traceable and their position is marked by series of spiral shallow punctures, two in the upper whorls and three in the last, as is the case in *P. chinensis*; indeed it is scarcely possible to distinguish the two forms.

21. **Corbicula fluminea Müller.**—"Abundant, eaten by the natives" at Yokohama.

Two of three specimens of this species are clothed with a nearly black epidermis becoming greenish-olive towards the margin of the valves; the third is brownish-olive. The interior is precisely the same as that of Chinese specimens, being of a purplish colour, darkest towards the edges and whitish in the umbonal region.

I fail to distinguish any specific differences from this species in *C. orientalis* of Lamarck, and *C. fluviatilis* of Müller.

NOTE ON THE GENUS *BOURCIERA*.

By THOS. BLAND.

Bourciera was described as a genus of the family *Cerithiostomatæ*, in 1851, by Dr. Pfeiffer, and similarly treated in his *Monographia Pneumonopomorum Viventium* (1852) also in the first (1858) and second (1865) Supplements. In the last he refers to the assertion of Troschel that *Bourciera* from the character of the dentition belongs rather to the *Helicinacea*.

Paetel (Catalog. 1873) places this genus in the subfamily *Realiae*.

Pfeiffer in his third supplement to the Monograph (1875) deals with *Bourciera* as "Subfamiliae ambiguæ genus."

The close alliance of *Bourciera* with the family *Helicinacea* is shewn not only as regards animal by the dentition, but as to shell by the absorption of the internal septa of the whorls, as in *Stoastoma*, *Trochatella*, *Lucidella*, *Helicina*, and *Alcadia**; the existence of this character in *Bourciera* has not hitherto, I believe, been published.

NOTE ON *HELIX PULCHELLA*, Müller.

By HENRY HEMPHILL.

It may be of interest to some of the readers of the Journal to know that the small *Helix pulchella*, Müll., which is found throughout Europe, Siberia, Madeira, Azores, &c., also has a wide range in North America. It is credited to Canada East, Florida, Nebraska, and Kansas. In the Spring of 1861 I had occasion to visit the White Pine Mining district in Nevada, and at an elevation of 8000 feet I found it quite abundant, associated with *Popa Arizonensis*, Gabb, and *Vitrina Pfeifferi*, Newc. I also found it quite numerous 75 miles south of White-Pine district, on a rocky hill side at a much lower elevation. In 1871 I visited Idaho territory and

* Bland : Annals Lyc. Nat. Hist., New York, 1854.

found the little fellow flourishing upon the high table-lands lying between the headwaters of Clearwater and Snake Rivers. I think upon more thorough research it will be found to be universally distributed throughout the mountain ranges running through the great basin between the Rocky and Sierra Nevada Mountains, and may yet be discovered west of the Sierras. Some writers favor the idea that it has been introduced in America through commerce, but I think that an error, the fact of its being found in such remote localities, in a wild and unsettled country, far away from the great travelled routes across the continent, and its apparently universal distribution in such a high altitude seems to me to preclude such a possibility; we must therefore account for its presence in America upon some other grounds, possibly a separate creation?

NOTES ON THE OCCURRENCE OF RARE AND LOCAL SHELLS IN UNRECORDED LOCALITIES.

By W. G. BLATCH.

In the hope that they may be interesting to the readers of "The Quarterly Journal of Conchology" I have been induced to cull the following "Notes" from my Journals and memoranda. Besides, whilst profiting from the Notes of other contributors, I have felt a little compunction for omitting to add to the general stock any little items of Conchological knowledge of which I happened to be the possessor.

Zonites excavatus var. *vitrina*, *Pur.* On the 20th September last, whilst searching for *Pselaphidae* in moss attached to a Poplar tree growing in a damp meadow between Knowle and Packwood, Warwickshire, I found a species of shell with which I was not previously acquainted. After cleaning and labelling it, I was about to put it away until I should find an opportunity of critically examining it, when my friend Mr. W. Nelson having come in unexpectedly, I showed the specimen

to him and he pronounced it to be *Zonites excavatus* var. *vitrina* a species not previously recorded as occurring in this district.

Helix aspersa var. *exalbida*, *Menke*. I found two specimens of this shell at Cambridge in July 1873: they occurred by the roadside about half-a-mile from the Railway Station. I have searched for additional specimens in the same locality subsequently but without success.

Helix Cantiana, *Mont.* Near Henley-in-Arden, in the heart of Warwickshire, the turnpike road has been cut through a hill composed of red marl, and on the banks of the cutting, on both sides of the road, *Helix Cantiana* abounds, although I do not know of its occurrence anywhere else in the county. I found it there during a Saturday Afternoon Excursion of the Birmingham Natural History & Microscopical Society in the summer of 1873. I believe this species was not previously known to exist in Warwickshire.

Helix fusca, *Mont.* Whilst "sweeping" for *Coleoptera* in North Wales, during August and September last, I found this species in such abundance as to be a nuisance. Large numbers were collected at each stroke of the sweeping-net; and becoming crushed up in a slimy mass, rendered it next to impossible to extricate the minute forms of Beetle-life from the refuse, everything in the net being hopelessly agglomerated. This species was extremely abundant near the Torrent Walk, Dolgelly, and on the road from Pensarn to Crafnant and Cwm Bychan. In August 1874, I found a few specimens of this shell near Stonehouse in Gloucestershire, which vary from the type in being flatter and of a harder texture. Some of the North Wales specimens are exceedingly delicate in texture and pale in color.

Clausilia Rolphii, *Gray*. During the Marine Excursion of the Birmingham Natural History & Microscopical Society to Teignmouth in September, 1873, and while on a

casual visit to Newton Abbot, I found a few specimens of *Clausilia Rolphii*, in company with *C. rugosa*, *C. laminata*, etc. under Beech and other trees by the roadside a short distance from Newton Railway Station. Mr. John Morley was with me at the time and I pointed *Rolphii* out to him with the remark that I had been fortunate in finding that rather rare shell in what I believed to be a new locality.

***Clausilia rugosa* var. *albida*, Jeffr.** During a short visit to Suffolk in July, 1873, I found a single specimen of this shell on a Railway arch near the village of Gislingham.

SPECIES *VERSUS* VARIETIES.

By J. T. MARSHALL.

In your number for August, 1875, Mr. Simpson appeals to some one to "remove the difficulties which perplex his mind as to what really constitutes the difference between a species and a variety, and make clear to him what is the principle upon which such differences are formed."

I will endeavour to reply to him, but fear his mind will still remain perplexed, in common with all conchologists, on this often-asked but unanswerable question. For if Dr. Jeffreys, after a life-long and careful study of the mollusca, declares that the separation of varieties from species "is often extremely perplexing," Mr. Simpson cannot hope to have his mind set at rest by a discussion in your columns. Long experience and acute observation will do something, but even then there will always remain forms perplexing to the conchologist.

To explain his meaning (or perplexity) Mr. Simpson cites several what he calls "test cases," in which I think he is unfortunate in the election. For instance, he says he has compared *Helix rufescens* and *Helix hispida* for a long time without being able to find a

distinguishing character not possessed by each; but *H. rufescens* is never hispid except in a young stage of growth, and it is then strongly keeled; moreover, it is double the size in an adult state. He also considers that *Clausilia laminata* "much resembles *C. biplicata*." I really do not know in what, and I do not think any conchologist has any difficulty in separating them. The specific distinction is sometimes more apparent in the animal than in the shell, especially in the marine fauna, and if Mr. Simpson will study the malacological side of the question, he will find that often where the shell is intimately allied, the difference in the mollusc is much greater.

Mr. Simpson then declares:—"It is thus next to impossible to discover the principle upon which conchologists proceed in manufacturing their species." Of course not, for there is no principle in manufacturing species, or varieties. It is the "right of every naturalist to follow the bent of his own discretion or inclination in the extension or reduction of species, subject only to the opinion of his scientific compeers." And Mr. Simpson may even make a var. *decollata* of his *Limnea stagnalis* (which, by-the-by, is of common occurrence) if he pleases, but it will depend on the weight of his authority and experience if "the opinion of his scientific compeers" follow him.

Every work on conchology contains disputable species and varieties which give rise to criticism, for no author is infallible; and though Dr. Gwyn Jeffreys' work may contain some apparent contradictions, it embodies a mass of solid information and results of careful study as is not to be found, in my opinion, in any other work of the kind — or, in fact, all other works put together.

In conclusion, I would point out that Mr. Simpson himself unwittingly quotes, from Dr. Gwyn Jeffreys' work, what must, after all, be the standard for the guidance not only of conchologists, but of all other sciences, in the determination of species:—"Certain definite forms called species, exist and constitute more or less extensive groups of individuals which resemble each other, as well as their parents and offspring, to the same extent as we observe in those of our own kind. These groups, to deserve the name of species, must be distinct from others; because, if any of them are

so intimately blended together by intermediate links as to make the line of separation too critical, the test fails, and a subordinate group, or a 'variety,' is the result."

NOTE ON THE IDENTITY OF VARIOUS EUROPEAN *HELICIDÆ.*

By C. P. GLOYNE.

Through the liberality of my French friends and correspondents, especially M. de St. Simon and M. l'Abéé Dupuy, I have had the opportunity of examining and comparing specimens of various reputed species, and I will briefly mention one or two conclusions I have come to.

Azeca Nouletiana, Dupuy, is a variety of *A. tridens*, Pult. The British specimens in my possession all belong to this variety.

Azeca Mabilleana, Fagot, is not even a variety; I cannot see any difference between it and the typical *tridens*.

Clausilia nigricans, Pult. I fail to perceive any difference between it and *C. rugosa*, Drap. Moquin Tandon says that the rimo in *nigricans* are closer than in *rugosa*, but I see no difference. All the subvarieties—*Reboudii*, Dupuy; *abicitina*, Dupuy; etc.—must be sunk in the species *rugosa*, Drap.

Cecilianella acicula, Müll., *Liesvillei*, Bourgt., *anglica*, Bourgt. These are absolutely identical, and I suspect that most of the other so-called species of *Cecilianella* must follow suit.

Helix nubigena, Charp. This is a variety only, but of *carascalensis*, Fér., not of *cespitem*, Drap. as Moquin Tandon says.

Buliminus niso, Pfr. I suspect that two forms have been included under this name, one only a variety of *B. quadridens*, Müll., but the other more elongate and cylindrical, a distinct species.

Clausilia Meissneriana, Shuttl., *Küsteri*, Rossm., *adjaciensis* Shuttl. These are terribly alike.

REMARKS ON THE SOUTH AUSTRALIAN HELICES,
WITH A NOTICE OF ALL THE SPECIES KNOWN UP
TO THE PRESENT DATE.

By GEORGE FRENCH ANGAS, F.L.S., C.M.Z.S., F.R.G.S., &c.

Prior to the year 1860, when I first commenced searching for land shells in the province of South Australia, only six of the species of *Helix* found there were described, and these were all, (except one) species which occur in other parts of Australia, viz.:—*Helix Stutchburyi*, Pfr., *H. brevipila*, Pfr., *H. juloidea*, Forbes, *H. rustica*, Pfr., and *H. confusa*, Pfr.

During a residence in the colony of three years, I was enabled to add eleven more species, which were described from my specimens by Pfeiffer, Crosse, Arthur Adams, and myself. When Dr. Cox, of Sydney, published his "Monograph of Australian Land Shells" in 1863, he swelled the list of South Australian Helices to twenty-two, by the addition of five other species, described by him self. Since then I have been able to add six more species, thus making the total number twenty-eight. They are as follows:—

1. *Helix rustica*, Pfr. in Zeit-schrift für Malac. 1852.
2. *Helix Waterhousei*, Cox, Monog. 1868.
= *H. subangulata*, A. Adams and Angas, Proc.Z.S., 1863.
The name was altered by Cox, it having been preoccupied for a Tasmanian species in 1854.
3. *Helix penolensis*, Cox, Proc. Z.S. 1867.
Penola, South Australia.
4. *Helix albumenoidea*, Cox, Mon. Aust. Land Shells 1868.
Flinders' Range.
5. *Helix Murrayana*, Pfr; Proc. Z.S. 1863.
Cliffs of the Lower Murray.
6. *Helix Adelaidæ*, Pfr. Proc. Z. S., 1856.
Near Adelaide.
7. *Helix retepora*, Cox, Proc. Z.S. 1867.
Flinders' Range.
8. *Helix Morti*, Cox, Cat. Aust. Shells 1864.

9. **Helix cyrtopleura**, *Pfr.* Journ. de Conchyl. 1862.
Plains near Lake Torrens.
 10. **Helix Phillipsiana**, *Angas*, Proc. Z.S. 1873.
Near Arrowie, interior of South Australia.
 11. **Helix Eyrei**, *Angas*, Proc. Z.S. 1876.
Near Lake Eyre.
 12. **Helix Howardi**, *Angas*, Proc. Z.S. 1876.
Near Arrowie, 450 miles north of Adelaide.
 13. **Helix Silveri**, *Angas*, Proc. Zool. Soc. 1868.
Eastern Plains.
 14. **Helix perinflata**, *Pfr.* Proc. Z.S. 1863.
Mc. Donnell Ranges.
= *pachystyloides*, Cox Monograph 1868.
 15. **Helix patruelis**, A. Ad. & Ang. P.Z.S. 1863.
Port Lincoln.
 16. **Helix Angasiana**, *Pfr.* Journal de Conchyl. 1862.
Arrowie, near Lake Torrens.
 17. **Helix Flindersi**, A. Ad. & Ang. P.Z.S. 1863.
= *bitæniata* Cox Monograph 1868.
 18. **Helix cassandra**, *Pfr.* P.Z.S. 1863.
Cliffs of the Lower Murray.
 19. **Helix Evandaleana**, *Pfr.* P.Z.S. 1863.
Evandale, North Rhine, and Barrier Ranges.
 20. **Helix Lincolnenensis**, *Pfr.* P.Z.S. 1863.
Port Lincoln.
 21. **Helix Lorioliana**, *Crosse*, Journ. de Conchyl. 1863.
Western slopes of Flinders' Range.
 22. **Helix luteo-fusca**, *Cox*, Monograph 1868.
Flinders' Range.
 23. **Helix Broughami**, *Angas*, P.Z.S. 1875.
Port Lincoln.
 24. **Helix brevipila**, *Pfr.* P.Z.S. 1849.
 25. **Helix Stutchburyi**, *Pfr.* P.Z.S. 1856.
Scrubs near Port Elliott.
 26. **Helix confusa**, *Pfr.* P.Z.S. 1855.
 27. **Helix Bednalli**, *Brazier*, P.Z.S. 1871.
Hills near Adelaide.
- I consider this shell to be merely a thin variety of *H. Grayi*. *Pfr.*
28. **Helix juloidea**, Forbes, Voy. Rattlesnake. 1851.
Rapid Bay.

DESCRIPTIONS OF FIVE NEW *MARGINELLÆ*.

By F. P. MARRAT.

***Marginella Tyermani*, n. s.**

Marg. testa fusiformi-ovata, cinereo-alba, lineis nigris conspicuis equidistantibus undique cingulata, spira brevi, anfractibus superne obtuse angulatis, ad angulum plicato-nodulatus, columella quadriplicata, labro late incrassato, intus denticulato.

Var. With the lip smooth inside. The Corisco specimen.

Found in company with *M. boltii*, Sow., and is about the size of *M. festiva*, Kien.

Hab. 1 Corisco Bay, 1 near Cape Palmas, West Africa. Coll. Keen, Liverpool.

***Marginella perla*, n. s.**

Marg. testa tumida cylindrica, nitente, flavescens alba, sub-vitreus, spira subexserta, labro-subflexuosa, columella biplicata.

An inflated semitransparent shell with only two folds on the columella.

Allied to *M. triplicata*, Gask., but four times the size of that shell, more glassy, inflated and has a much wider aperture.

Hab. ?

***Marginella præcallosa*, Higgins.**

Marg. testa cylindraceo-oblonga, cinereo-alba, grisea linearis-strigata, fasciis duabus distantibus, spira parva, anfractibus superne tumidi-fuscis, columella valde expansa callosa, quinque-plicata, labro valde calloso-reflexo, intus flexuoso plicata.

Long. 25 mill. Diam. 12 mill.

A fine bold shell with the collar expanded in front and the inner edge of the outer lip, sinuously plicate.

In the collection of the Rev. H. H. Higgins, Rainhill.

Hab. ?

***Marginella Warrenii*, n. s.**

Marg. testa fusiformi-oblonga, lutescente lactea, fasciis duabus aurantio-fuscis latiusculis cingulata, spira producta, subobtusa conica, apice obtuso : labro subflexuoso : columella quadriflicata

Collected by Capt. Cawne Warren, in lat. $50^{\circ} 23' 5''$ N. and long. $64^{\circ} 5' 4''$ W. and presented by him to the Free Public Museum Liverpool.

Long. 20 mill, Diam. 8. A giant (*Volvarina*.)

This is a large form of a type already well known, such as *M. gracilis*, C. B. Ad., = *M. bibalteata*, Reeve, pl. 20, fig. 99, and *M. suavis*, Sow., Journ. de Conch., Vol. 8., p. 126., pl. 2., fig. 13.

Marginella callosa, n. s.

Marg. testa oblongo-ovata, superne tumida, callosa, albida aut spadicea, pallide fasciata, crassa, nitente, spira brevi valde callosa, columella quadriplicata, ad basin tumida, columella et apertura incrassata, fauce alba.

Hab. Red Sea.

I only know of four specimens of this shell, three in Mr. Keen's collection and one in mine.

It somewhat resembles the *Olivá micans*, Solander, having a thick callous spire.

The Marginella phrygia, Sow., and *M. calculus*, Redf.

M. calculus, Redf., *M. guttata*, Swainson,* *M. maculosa*, Reeve as per Kiener, and probably the *M. phrygia*, Reeve.

Reeve says in alluding to this last named shell:—Allied to the *M. maculosa* of the West Indies.

This shell is allied to the *M. interrupto-lineata*, Megerle, = *M. interrupta*, Lam. *M. obesa*, Redf., *M. similis*, Sowerby, and *M. imbricata*, Hinds.

M. phrygia, Sow., is a very different shell, allied to the *M. frumentum*, Sow., *M. sagittata*, Hinds, and *M. catenata*, Montg.

The markings are similar; in one of the varieties of *M. calculus*, the rings are like the rings in *M. phrygia*; thus confusion has arisen.

The *M. maculosa*, Kiener, is the *M. muralis*, Hinds, as pointed out by Petit, Journ. de Conch., 1851, p. 55, and since by Redfield.

*This name is pre-occupied by Dillwyn.

LAND SHELLS OF THE ISLES OF SCILLY.

By W. H. HATCHER.

I was able, in the summer of 1875, to carry out a long-cherished wish, and to make a visit to the Isles of Scilly. My own special 'hobby' is the collection of Land shells; but I almost fear that I shall be set down by enthusiastic conchologists, as unworthy of a place in their confraternity, when I confess that I found in Scilly so much to please and interest me, that my week in the Islands passed without my giving any great attention to the shells.

A collection of the Island-shells (Land and Fresh-water) kept at Treseco Abbey is made up of the following species:—

<i>Sphaerium corneum</i> , Linn.;	<i>Helix rufescens</i> , Pennant;
<i>Planorbis vortex</i> , Linn.;	" <i>revelata</i> , Fer.;
<i>Limnea peregra</i> , Drap.;	" <i>sericea</i> , Drap.;
<i>Vitrina pellucida</i> , Muller;	" <i>pulchella</i> , Muller;
<i>Succinea putris</i> , Drap.;	" <i>rotundata</i> , Muller;
<i>Zonites alliarius</i> , Muller;	<i>Bulinus acutus</i> , Muller;
<i>Helix aspersa</i> , Muller;	<i>Cochlicopa lubrica</i> , Muller;
" <i>nemoralis</i> , Linn.;	<i>Balea perversa</i> , Linn.;
" <i>virgata</i> , Da Costa;	<i>Pupa umbilicata</i> , Drap.;

Of these eighteen species I found twelve with little trouble, and I also found *Zonites Cellarius*, Muller (and I think *nitidulus*, Drap.?), not named in the Treseco collection. And I believe that a conchologist who published his list of 'findings' some two or three years ago, in the Penzance Natural History Magazine, gave a notably longer list than the above, though I cannot at present refer to this list.

I had thought it probable that the Land-shells of Scilly would present marked peculiarities. For the time which must have passed since these islands were separated from the mainland must be very long, and during this time the island-shells have been continually under very marked and very unusual conditions of existence, while it is probable that few specimens find their way across from the mainland, so as to introduce a means of modifying the insular individuals.

I was then surprised to find scarcely any difference between the island and mainland species. Generally the Scillonian shells are somewhat thinner and more fragile than those on the mainland, probably because the islands (being composed wholly of granite) may be wanting in lime. *H. Aspersa* was smaller than our usual shells and *Limnaea Peregra* was of the small variety "*Maritima*" found near the sea-coast. *H. Sericea* was plentiful and larger than specimens which I have from the mainland. But the other shells did not differ (so far as I saw) from the corresponding mainland specimens. It still appears singular to me that such a peculiar situation, with so little chance of crossing with individuals modified by different conditions, should have had almost no visible effect on the Scillonian land-mollusks. But on the other hand it must not be forgotten that our British land-shells seem to be generally of species which can bear great variations of climate, &c., or we should not find our living individuals so little altered from the semi-fossilized specimens which are found in the Brick-earth. The Cave-Lion, Mammoth, Rhinoceros, Reindeer, &c., living in the British Islands when the Brick-earth was deposited, have all died out; but the changes which proved fatal to their continuance have scarcely modified the land shells. The tenacity of form I had clearly undervalued when I expected to find in the Scillonian specimens of our British land-shells marked effects of their isolated situation.

A White variety of *Limnaea palustris* taken at Southport.—Whilst collecting shells at Southport on July 25th. 1876. I found a good quantity of *Physa hypnorum* and *Limnaea palustris* and amongst the latter I was so fortunate as to take a pure white variety, though all the others (of which I got some dozens) were of the usual color. This must be very rare, as I have never seen it before, and the only mention I can find of it is in No. 2 of the Q.J.C.—EDWARD COLLIER.

BIBLIOGRAPHY.

Mollusca of Kerguelen's Island.—By W. H. Dall.—
Bulletin of the United States National Museum, 1876; No. 3,
pp. 42—48.

An interesting account of the Mollusca obtained in Kerguelen Island by J. H. Kidder, M.D., Naturalist to the American "Transit of Venus" Expedition. Fourteen species were obtained, of which the following are characterized as new, two new genera being established for their reception:—

Hemiarthrum setulosum, (Cpr. MS.) Dall.

Kidderia minuta, Dall.

Lepton parasiticum, Dall.

Octopus ? The beaks of an Octopus were obtained from the stomachs of Sea-birds.

The genus *Eatonia*, established by Mr. Smith, is modified by Mr. Dall to *Eatonella*, *Eatonia* being already used to designate a genus of Brachiopods.

Eatonella Kerguelensis, Smith. Dr. Kidder's specimens obtained at low water mark on Fuci, vary greatly from the diagnosis of Mr. Smith, and if found on comparison to be distinct, the author proposes they should be called *Eatonella inflata*.

Eatonella Smithii, Dall = *E. caliginosa*, Smith. The name *caliginosa* being pre-occupied by Gould for a Fuegian species.

Purpura striata, Martyn. A common New Zealand species.

Patinella Magellanicus, Gmel. Dead specimens; found also at Straits of Magellan.

Patella ? Delesserti, Philippi. One specimen, dead; found also at Straits of Magellan.

A new genus, *Hemiarthrum* (Cpr. MS.), of Chitonidae is established for an undescribed species, and characterized as follows:—

Valvae terminales laminatae, haud articulatae, laminæ laterales

obsoleta; *Zona lanuginosa*, *porifera*; *branchiae posticæ*.

Hemiarthrum setulosum, Cpr. On stones at low water. This shell externally resembles some of the coarse, ill-defined *Acanthochitons*. It forms a transition between *Hanlieia* and the articulate Chitons.

Helix (Hyalina) Hookeri, Pfr. "Gregarious about and under stones. Occasionally the shell appears to be partly membranous, and in drying, from this cause, the spire is frequently abnormally flattened."

Siphonaria tristensis, Sow. Abundant between tide-marks, also found at Tristan d'Acunha, and Orange Harbour, Patagonia.

Lasea rubra, Mont. Rather larger than most northern specimens.

Lepton parasiticum, Dall. Abundant in the channels leading to the oral aperture of an *Echinus (Tripylus)* where it appears to lead a parasitic or commensal existence. The shell is of extreme tenuity and must almost entirely have been enveloped by the soft parts. The dentition resembles the other species of the genus.

A new genus, *Kidderia*, of *Modiolaridae* is established for a species found by Dr. Kidder. It differs from *Modiolarca* in its single anterior muscular scar, the presence of strong nymphæ for the subinternal ligament, and in the full development of the cardinal teeth. *Modiolarca pusilla*, Gould, from Tierra del Fuego, appears to belong to this group.

Kidderia minuta, Dall. This minute species was found attached to the byssus of *Mytilus canaliculus*. It has also been obtained by Mr. Dall from Orange Harbour, Patagonia.

Mytilus Magellanicus, Chemn. Found also in New Zealand, and at the Straits of Magellan.

Mytilus canaliculus, Hanley. The shell of this species closely resembles some of the varieties of *M. edulis*, but the soft parts are quite different. Inhabits also Chili and New Zealand.

Mr. Dall is now engaged in examining the large collection of Shells from New Zealand, Tasmania, Auckland and Chatham Islands made by Dr. Kershner, the results of which will we hope be shortly published.

"Descriptions of 4 New species of *Helix*; with some notes on *Helix Angasiana* of Pfeiffer."—By George French Angas, F.L.S., C.M.Z.S., F.R.G.S., &c.

P. Z. S., Feb 15th, 1876, pp. 264—268.

Helix beatrix (pl. XX, figs. 1—5.). Solomon Archipelago. This shell, like *Helix meta*, Pfr. is very variable in color, five varieties being enumerated, ranging from pellucid white to dark purplish chocolate or rich orange. It may be readily separated from *Helix meta* by its smaller size, more convex whorls, and rounder aperture, in which the subflexuous outer lip and diagonal form of *Helix meta* are wanting. The outer lip is also much less expanded and reflected, the texture less glossy and shining.

Helix Ransdieri (pl. XX, figs. 6, 7.). Solomon Archipelago. Somewhat allied to *Helix Boivini*, Petit, (*H. subrepta*, Quoy,) but the whorls are more rounded, the last whorl smaller, and the shell generally more conical. The peculiar white spots on the central black band reminiscent of similar markings in *H. ambrusia*, Angas. The scarlet outer lip so constant in *H. boivini* is entirely absent in the present species, and the shell is of a bluish white color.

Helix Moretii (pl. XX, figs. 8, 9.). Port Denison, Northern Queensland. Approaches most nearly *Helix Yulei*, Forbes, but is larger, much more conical, with the base of the whorl peculiarly flattened.

Helix rhodope (pl. XX, figs. 10—12). San Christoval, Solomon Archipelago. This species belongs the *Trochomorpha* group, its nearest ally being *Helix merziana*, Pfr.

Helix Angasiana, Pfr. (not Newcomb). Originally described in 1862 by Dr. Pfeiffer in the "Journal de Conchyliologie" from a dead and bleached specimen sent to him by Mr. Angas, from the neighborhood of Lake Torrens, South Australia. On obtaining living and unbleached specimens, the amended description was published in the same journal by Mr. Angas in 1863. Dr. Cos of Sydney, however, still regards Pfeiffer's original description "Solid, white and porcellaneous" as the normal state of *H. Angasiana* and gives *H. Angasiana* not Pfeiffer, referring to the amended

description by Mr. Angas) as synonymous with *biteuiata*, Cox. *Helix biteuiata*, Cox, (1868), must be placed in the synonymy of *Helix Flindersi*, A. Ad. & Ang., (P.Z.S. 1863).

Helix Angasiana, Newcomb, must stand as *Helix bougainvillei*, Pfr.

Notes on certain Terrestrial Mollusks, with descriptions of New Species.—By Thomas Bland.

Reprinted from the Annals of the Lyceum of Nat. Hist., New York, vol. xi, February, 1874, pp. 72—87.

This highly interesting paper, of which we give a full abstract below, enumerates 28 species, giving under each very new and valuable information on their synonymy, habitat, dentition, classification, &c.

Five new species are described, viz.:—

Zonites Lansingi, Bland.

Zonites Stearnsii, Bland.

Helix (Plagiptycha) Sargentii, Bland.

Macroceramus Swifti, Bland.

Macroceramus Klatteanus, Bland.

Oleacina flexuosa, Pfr. An examination of the collection of the late Robt. Swift, reveals the habitat of this species, which was previously unknown, to be Aux Cayes; it is the only W. Indian species, nearly allied to the large Mexican forms.

Macrocyklis euspira, Pfr. This Venezuelan species is placed by Von Martens in *Ammonoceras*, a subgenus of *Hyalina*. Its lingual membrane is that of *Macrocyklis*, differing only from the North American species in having all the teeth purely aculeate. The central tooth is of the true *Glandina* type, differing in this respect from the North American species of the genus.

The smooth anterior surface and decided median projection to the cutting margin of the jaw, combined with the form and arrangement of the teeth, and absence of true laterals, warrants its place in *Macrocyklis*.

Macrocyelis Baudoni, Petit. The jaw and dentition place this species in *Macrocyelis*.

Macrocyelis concolor, Fer. Probably synonymous with the last. They are placed by Von Martens in *Mörchia*, (subgenus of *Hyalina*). Shuttleworth avers that *M. concolor* is viviparous. *Macrocyelis* is essentially an American genus, four species being found on the Pacific slope of North America and one on the Eastern slope. *M. concolor* is from Puerto Rico, *M. Baudoni* from Guadaloupe and Dominica, *M. euspira* from Venezuela and *H. paucispira*, Poey, which Mr. Bland thinks will prove to be a *Macrocyelis*, is from Cuba.

Zonites Lansingii, Bland. Astoria, Oregon. Its upper aspect is very like *Zonites multidentatus*. This species is the only mollusk known with zonitiform shell and aculeate marginal teeth and having a decidedly ribbed jaw. It cannot satisfactorily be referred to any described genus. It is dedicated to Mr. A. Ten Eyck Lansing of Burlington, N.J., and was discovered by the indefatigable Mr. H. Hemphill of Oakland.

Zonites Stearnsii Bland. Among specimens sent by Mr. Stearns for examination is a single specimen of a shell from Astoria, Oregon, allied to *Z. Lansingii*. It is larger, more elevated, and more distinctly striated, has seven whorls, with a wider and rounder aperture, and is deficient of lamella within the outer margin of the peristome. Having only a single specimen Mr. Bland delays a formal description.

Zonites indentatus, Say. Pfeiffer gives St. Domingo as an habitat of this species. Dr. Cleve found specimens in Puerto Rico, which, except being darker colored, are scarcely distinguishable from American specimens.

Hyalina Bermudensis, Pir. The dentition of this species places it according to the observations of Bland and Birney amongst Vitrinea, and not amongst the Helicacea as in Von Martens arrangement.

Mr. Bland proposes the name of *Hyalina Nelsoni* for a subfossil form found in caverns at Tucker's Town, Bermuda, in honor of Lieut. Nelson, author of valuable Geological Memoirs.

on Bermuda and Bahama. It is nearly allied to *H. Bermudensis*, but is much larger.

Güesteria Powisiana, Pfr. Mr. Bland found a specimen in 1851 of this species near Marmato, at 5000 ft. elevation on the Western Cordillera of the Andes.

Simpulopsis Dominicanus, Pfr. The "Vitrina" mentioned by Pfeiffer as from Haiti is probably a young shell of this species.

Helix bracteola, Fér. Identical with *H. vortex*, Pfr.

Helix Sargentii, Bld. Little Inagua, Bahamas. It is similar in form to *H. Duclosiana*, Fér., but the interior projecting tooth, and basal marginal callus are wanting. It belongs to the subgenus *Plagiptycha*, which is peculiarly characteristic of the Haitian fauna, and is additional evidence of the former more intimate connection of Inagua and Turks' Island with Haiti. The species is dedicated to Mr. Daniel Sargent of Inagua.

Helix Marginella, Gmel. This species occurs in Vièque and Culabré as well as in Puerto Rico. In some specimens from Mayáquez, Puerto Rico, the dark band almost covers the upper whorls, leaving only a narrow lighter colored line next the sutures; the dark band equally wide at the base.

Helix Gaskoini, Pfr. St. Domingo. Probably a variety of *H. bizonalis*, Desh.

Helix bizonalis, Desh. The habitat, apparently unknown by Deshayes, is erroneously given in Chemnitz as Manilla, but the correct locality is Haiti. Deshayes places *H. Marginata*, Fér., in the synonymy. The occurrence of the nearly allied forms of *H. Sagemoni* in Cuba, *H. bizonalis* in Haiti, and *H. Marginella* in Puerto Rico is interesting. The faunal connection of Haiti and Puerto Rico is shown by the prevalence of forms closely related to *H. caracolus*, and *H. Andebatii* of Haiti is nearly allied to *H. Luguillensis* of Puerto Rico. *H. bizonalis* is placed by Von Martens (Alliens, ed. 2) in the subgenus *Ciliat*, while *H. Sagemoni* and *H. Marginella* are in *Caracolus*.

Helix platystyla, Pfr. Pfeiffer doubtfully gives the locality as "Moluccas," and places it next *H. conspersula*, Pfr. and *H. fuscinota*, C. B. Ad., of Jamaica, to which it is very closely allied.

A specimen from Jamaica in Mr. Bland's cabinet and others in the Chitty collection, labelled *H. fusco-cincta*, var., agree closely with Pfeiffer's description and Reeve's figure. *H. platystyla* belongs to Jamaica as well as *H. conspersula* and *H. fusco-cincta*.

Cylindrella gracilicollis, Fér. Previously erroneously attributed to St. Thomas—Mrs. Wm. Klatte has found this species at Port au Prince, Haiti. On the axis are 2 revolving laminæ, possessed also by *C. Salleana* and *C. Hjalmarsoni*; no strictly Jamaican species has this peculiarity.

Macroceramus Swifti, Bland, n. sp. Turk's Island and Inagua, Bahamas. Dedicated to Mr. Robt. Swift. Closely allied to *M. Hermanni*, Pfr., of Haiti, but less distinctly costulated, suture not crenulated, and with thicker peristome.

Macroceramus Klatteanus, Bland, n. sp. Port au Prince, Haiti. Allied in form and ornamentation to *M. tenuiplicatus*, Pfr., but is much smaller, is costate, and has a differently formed aperture. Dedicated to Mrs. Wm. Klatte.

Bulimus stramineus, Gldg. Occurs at the Island of Mustique, one of the Grenadines, as well as at St. Vincent's. The commonest form is of an uniform bright yellow; some specimens have a purple apex and others several narrow reddish-brown bands.

Bulimulus stramineus, Richard. In the Swift cabinet are shells under this name received from M. Sallé and said to be from St. Domingo. Mr. Bland can nowhere find mention of such a species. It is very like and may be a variety of *B. liliaceus*, Fér., of Puerto Rico. The two upper whorls have a pale yellowish tinge, the apex rather darker.

Stenogyra Dominicensis, Pfr. Described in 1850 by Pfeiffer as a *Balot* and again in 1856 as *Bulimus hasta*. Shuttleworth in 1854 referred it to *Stenogyra*, which is confirmed by the character of its jaw and dentition. Mr. Bland states that the species is viviparous.

Sterphia calcarea, Pfr. Collected by D. Sargent on Little Inagua, the habitat being previously unknown. The parietal tooth is

not mentioned in Pfeiffer's description.

Strophia iostoma, Pfr. Mr. Sargent found very large specimens at Great Inagua.

Choanopoma occidentale, Pfr. Referred by Pfeiffer to Martinique, but according to M. Mazé does not occur there. Dr. V. Rijgersma found it several years ago in the Island of St. Martin.

Helix Ammonoceras, Pfr. Discovered in 1851 in New Granada by Mr. Bland; since found in the Island of Grenada, W. I.

Helix Hubbardi, A. D. Brown. Found originally in Texas by Mr. Hubbard and described by Brown. It was subsequently discovered in Jamaica and described by C. P. Gloyne as *Helix Vendryesiana*. Dr. Newcomb has found it in Georgia. It is allied to *H. labyrinthica*, Say, and not to *H. paludosa*. The distribution of *H. Hubbardi* is curious, but *H. Strebli*, Pfr., which is perhaps identical with *labyrinthica*, belongs to the Mexican fauna.

Helicina nemoralis, Guppy, from Trinidad, is scarcely distinct from *H. columbiana*, Phil., of Venezuela.

Auricula pellucens, Menké. A few dead specimens were found at the edge of a Mangrove swamp on a small Island on the West Coast of Florida, in company with a profusion of *Melampus bidentatus* and *M. coniformis*. *A. pellucens* is referred to Demerara, and *Zellobium Ceylanicum*, H. & A. Ad., placed in its synonymy by Pfeiffer, to Ceylon. Stimpson refers to the present tropical character of the shells of the West Coast of Florida as due to the influence of the Gulf Stream.

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Remarks on the Variation in Form of the Streptomatidæ with Descriptions of New Species.—By A. G. Wetherby.—Proc. Cincinnati Soc. Nat. Hist., Dec. 7, 1875, Vol. I., pp. 1—12, with plate.

The author, in company with Prof. Harper, has collected these Shells extensively at their head-quarters in many parts of Kentucky and Tennessee. The great and unusual facilities they possessed enabled reliable observations to be made on the habits

of the various species and the effects of any peculiar conditions carefully noted.

In studying the variation of the fluviatile mollusca, attention should be given to the fact of their growth being effected in a changing, moving medium, and under different conditions to land shells.

The *Strepomatidae* inhabit by preference rapidly flowing streams in mountainous districts, adhering to rocks, exposed to the full action of the current, with its varying impetus, and in time of floods carrying with it particles of sand, gravel, &c., the effect of which is often to loosen the shells from their moorings and also to remove by attrition the concretae growing on the rocks, which constitutes their food, subjecting them to a greater or lesser degree of privation. The periodical growth of the shell renders them more liable to the modifying effect of these causes, as the lips are tender and very fragile during the larger part of the summer months. The relation of sex and form and the effect of chemical influences are questions as yet imperfectly understood.

Dr. James Lewis, of Mohawk, whose name is so honorably associated with the *Strepomatidae*, ascribes their advent to the Carboniferous epoch, and Mr. Wetherby by a study of the vegetable and other organisms of that remote period infers the nature of the habits of their ancestral forms and conjectures them to have their analogues in the subtropical families of *Vivipara*, *Neritina*, *Melanist*, *Cerithidea*, &c., and that the *Strepomatidae* may have been evolved from these species by the operation of natural causes.

The author suggests the modern alliances of the tropical *Ampullaridae* and *Melanthro*, *Neritina* and *Anculosa*, *Cerithidea* and *Trypanestoma*.

If the suggestion of Dr. Lewis be a just one, that shells are propagated down stream, then the origin of these shells or their ancestral types, if still existing, will be found at the upper part of the drainage and that least affected by change of level.

Mr. Wetherby concludes this highly interesting paper by descriptions of the following five new species:—

Lithasia plicata, Wetherby. Green River, Tenn. (Pl. II, fig. 1.)

Angitrema parva, Wetherby. Stone River, Tenn. (Pl. I, fig. 2);
Angitrema angulata, Wetherby. Stone River, Tenn. (Pl. I, fig. 5);
Goniobasis plicato-striata, Wetherby. Stone River, Mill Creek and
 Sinking Creek, Tenn. (Pl. I, fig. 3);
Anculosa umbilicata, Wetherby. Stone River, Tenn. (Pl. I, fig. 4).

North Sea Dredging.—By John Leckenby, F.I.S., F.G.S.,
 and J. T. Marshall.—Annals and Mag. Nat. Hist., Dec. 1875,
 series IV, vol. xvi, pp. 390—4.

A lengthy list of species and varieties, the result of three dredging cruises to the Dogger bank. All the species enumerated were obtained between 20 and 90 miles from land, and at depths of from 7 to 50 fathoms. Fifty-seven species and twenty-one varieties of bivalves, and 63 species and 28 varieties of univalves are recorded as having been obtained.

Two varieties are described as new by Mr. Marshall, viz:—
Nucula nitida, var. *turgida*.—"Shell more triangular, and beaks more swollen. Corresponding with the deep water varieties of *N. nucleus* and *N. tenuis*.
Natica catena, var. *Leckenbyi*.—"Shell brown, without any colored markings. It resembles *N. sordida*, but is thinner and more globose. Searles Wood's *N. catena* from the Coralline Crag is similar to this. Obtained in 10 fathoms."

From a mass of *Filograna complexa*, an *Arca* was obtained, which Dr. Jeffreys refers to *Arca imbricata*, Poli, though from the absence of the notched inside margin, Mr. Leckenby thinks they may with more propriety be referred to *Arca nodulosa*, Müll.

The animal of *Natica Greenlandica*, Beck, is described from specimens found in company with *Scalaria Trevelyanæ*, Leach.

The occurrence of the four varieties of *Astarte sulcata*, Da Costa (*pauicostata*, *minor*, *incrassata*, and *multicostata*) is interesting, as they have been previously recorded from the Shetland Seas only.

Trochus occidentalis, Mighels, and *Tectura testudinalis*, Müll., are also noted, the nearest recorded locality of the former being

Aberdeenshire and of the latter Hartlepool. These species, therefore, also seem to be migrating southwards.

In addition to the species enumerated above, the following are new to the district:—

- Thracia papyracea*, var. *gracilis*.
- Neæra cuspidata*, Olivi.
- Dentalium entalis*, var. *infundibulum*.
- Turritella terebra*, var. *nivea*.
- Natica Montacuti*, var. *albula*.
- Fusus antiquus*, var. *alba*.
- Fusus antiquus*, monst. *cinctum*.
- Pleurotoma nebula*, var. *elongata*.
- Pleurotoma turricula*, var. *rosea*, Lovén.
- Actæon tornatilis*, var. *subulata*, S. Wood.
- Actæon tornatilis*, var. *tenella*, Lovén.

A list of 8 species is appended, dredged off Scarborough by Dr. J. Gwyn Jeffreys last May, during a short cruise in H.M.S. "Porcupine", viz.—

- Leda minuta* var. *brevirostris*.
- Tellina balthica*, L.
- Tellina calcarea*, Chem.
- Tellina tenuis*, Da Costa.
- Thracia convexa*, W. Wood.
- Panopaea plicata*, Mont.
- Cerithium reticulatum*, Da Costa.
- Defrancia teres*, Forbes.



Description of a new species of *Carinifex* from California. By Edgar A. Smith, F.Z.S.
P.Z.S., 1875, p. 536, with woodcut.

Carinifex Pontomii, Smith. This remarkable species of *Planorbis* was collected in California by Lord Walsingham. It is most nearly allied to *C. Newberryi*, Lea, from which it differs in

its thinner and lighter build, and in the more rapid increase of its whorls. In *C. Newberryi* the upper surface of the whorls is broadly flattened, and then acutely keeled and angulated, whereas in the present species they are rather convex, lack the carination, and show but a faint approach to an angulation and this is situated near the *upper* and not the *lower* suture; *C. Newberryi* is much more coarsely striated and clothed with a strong yellowish olive epidermis, and the mouth descends a trifle on the body-whorl, In the new species the mouth ascends and the epidermis is of a very pale olive and very thin. On each side of the rounded keel encircling the umbilicus there is a shallow depression.

Remarks on the genus *Alaba*, with the description of a new species.—By Edgar A. Smith, F.Z.S.

P.Z.S., 1875, pp. 537—540, with woodcut of the new species (*Diala Leithii*, Smith). From California.

D. Leithii differs from *D. picta* in the columella being more arculate, and the aperture more acuminate effuse at the base. The animal has the tentacles of equal (not unequal) length, the foot not auriculate, and is devoid of the four long tentacular filaments attached to the operculigerous lobe; the species may eventually form a distinct subgenus.

The genus *Alaba* was first characterized by H. & A. Adams as a subgenus of *Cerithiopsis*. Subsequently it was raised to the rank of a separate genus and placed in the subfamily *Litiopinae* by A. Adams.

In the generic diagnosis it is described as “*anfractibus plicatis seu varicosis, vertice submammillato. Apertura ovata, labio scpe vix truncato.*” The operculum is not mentioned. Of the enumerated species, *A. picta*, *A. cornea*, *A. felina*, *A. inflata*, and *A. phasianella* have the whorls smooth and not plicate or varicose, the labium in *A. picta* only showing the faintest approach to truncation, the columella in the remaining species being rather straight, generally

blending with the labrum, which is slightly effuse at the base.

The generic characters not being applicable to all the species, Mr. Smith proposes that "those species with the whorls strengthened with varices (generally tumid) and the columella more or less truncated (for this character is variable) shall constitute the genus *Albatia* proper; while those devoid of varices and wanting the columella truncation may form the subgenus *Diala*." The subgenus *Styliferina*, A. Adams, is closely associated with the preceding group, the chief difference being in the apex "vertice mucronata."

Mr. Smith considers that *Diala rufilabris*, A. Adams, should be placed in the genus *Hydreibia*, differing from *Diala* in the continuous peristome, very much thickened everywhere, and the oblique aperture and columella.

Dr. Leith, with whose name the species *D. Leithii* is associated, has supplied Mr. Smith with the following notes on the living animal—"LIP somewhat proboscisidiform, not used in progression and not usually projecting beyond the edge of the foot. TENTACLES, two, long, subulate or filiform, bearing the eyes on their outer side near the base. FOOT, much expanded in front and rounded, gradually attenuated posteriorly and caudated. REPTION not by alternate movements of right and left sides, but by an uniform undulating, progressive motion of the foot. It moved also in an inverted position along the surface of the water, as *Planorbis* and *Lymnaea* do."

Description of new land and freshwater Shells from India.—By Sylvanus Hanley, F.L.S.

P.Z.S., 1875, pp. 605—7.

Cyclophorus ophis, Hanl. Tenasserim.

Ampullaria Theobaldi, Hanl. Bhamao, Birmah.

Achatina (Glessula) senator, Hanl. Cottiyam Hills.

A. (G.) isis, Hanl. "Hab. Indiam meridionalem."

Unio vulcanus, Hanl. "Hab. Birmah, vel Pegu."

List of land and freshwater Shells collected by
Mr. Osbert Salvin in Guatemala in 1873-4.—By Dr. E.
von Martens, C.M.Z.S.

P.Z.S. 1875, part iv, pp. 647—9.

A list of thirty-two species is given; one of them being new, is characterized under the name of *Helicina anozona*, "Hab. Vicinity of Coban, Central America."

H. anozona, Martens, is allied to *H. fulva*, D'Orb., from Bolivia, and to *H. rotunda*, D'Orb., from the West Indies; the first is flatter, larger and differently colored, the latter has no spiral sculpture and a much thinner peristome.

On the Generic Peculiarities of the distinctively
Madeiran Achatinæ of Lowe.—By Rev. R. Boog Watson,
F.R.S.E., F.G.S.

P.Z.S. 1875, part iv, pp. 677—80, with woodcuts.

A new genus **Loweia** is established and its differences from *Achatina* characterized as follows:—"The mantle extends beyond the edge of the aperture all round, it is thinly spread over the outside of the shell, and extends like a tongue backwards behind the posterior corner of the aperture.

The tail carries a mucous gland and is abruptly truncated. The genus thus bears to *Achatina* the same relation that *Arion* does to *Limax* and *Nanina* to *Helix*."

All the members of the genus have an highly polished shell, caused by the perpetual movement upon it of the overlapping mantle, especially of its posterior elongation, a movement also eminently characteristic of *Nanina*.

The jaw is horny, light-brown, crescentic, with numerous small converging ridges, one of which forms a distinct median line. The edge is not toothed, but forms a continuous curve. The

radula consists of numerous rows of multiitudinous teeth, the central one minute, with a sharp central point, and a faint point on either side like a shoulder, and is attached to a strong flat basal plate, shaped like the crescentic cutting knife of a shoemaker; lateral teeth much larger, with a strongly developed centre point, and two broad sharp shoulders; they are attached to flat square basal plates and become rudimentary as they recede from the centre.

The author suggests that the *Achatina folliculus*, Gron., may belong to the new genus, and redescribes and includes four of Lowe's species, viz:—

Lovea (Achatina) melampoides, Lowe.

L. (*A.*) *tornatellina*, Lowe.

L. (*A.*) *triticca*, Lowe.

L. (*A.*) *oryza*, Lowe.

Descriptions of two new species of Marginellidae from the Cape Verd Islands.—By Edgar A. Smith.—Annals and Mag. Nat. Hist., Sept. 1875: Fourth Series, vol. xvi., pp. 200—201.

The two new species, *Marginella (Volvarina) verdensis*, Smith and *M. (V.) malivincta*, Smith, were obtained by the British Museum from Mr. P. Furse, of the Control Staff, who collected them whilst stationed at the Cape Verd Islands. Both belong to that section of *Marginella* to which Hinds (P.Z.S. 1844) gave the name *Volvarina*, and which contains a group of species having short small spires, narrow linear apertures, the columella furnished at the base with a few oblique folds, and the labrum exteriorly varicose.

New *Solenella* from South Patagonia.—“Description of a new species of *Solenella* from South Patagonia.”—By Edgar A. Smith.—Annals and Mag. Nat. Hist., August 1875, Fourth Series, vol. xvi, pp. 118—119.

The species described is *S. magellanica*, Smith.

Grosses Systematisches Conchylien-Cabinet, von Martini und Chemnitz.—Neue reich vermehrte Ausgabe, in Verbindung mit Prof. Philippi, Dr. L. Pfeiffer, Dr. Dunker, u. A., herausgegeben von Dr. H. C. Küster.

Die Schnirkelschnecken, (Genus HELIX). In Abbildungen nach der Natur, mit Beschreibungen von Dr. L. PFEIFFER. Nürnberg, 1846.

(Martini and Chemnitz's Great Systematic Conchological Work.—New and considerably augmented edition, published with the co-operation of Prof. Philippi, Dr. Pfeiffer, Dr. Dunker, &c., under the direction of Dr. H. C. Küster.

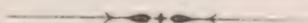
Genus *HELIX*, figured after nature, with descriptions by Dr. L. Pfeiffer. Nuremberg, 1846).

This large and comprehensive work, which has been for a long series of years in course of publication at Nuremberg, and is still in progress, was up to the date of his lamented demise under the editorial supervision of the eminent German conchologist Dr. H. C. Küster, with whom was associated in the preparation of the various monographs a number of equally distinguished collaborators, such as Prof. Philippi of Cassel, Dr. Ludwig Pfeiffer of Carlstadt, Dr. Kobelt of Frankfort, Dr. Brot of Geneva, Dr. Edmond v. Martens of Berlin, Dr. Dunker, Dr. Roemer, Herr C. H. Weinkauf of Kreuznach, and Herr S. Clessin.

Up to the present time upwards of one hundred and twenty genera and subgenera, embracing nearly six thousand species, have been figured and described, including many of the most important groups, such as the *Helices* and their allies, the *Cerastomaria*, the *Lymnaeida*, the *Trochidae*, the *Unioidea*, the *Canidae*, the *Potidae*, the *Tellinidae*, &c., &c.

The portion of the work now before us—the first Volume in four parts, of the Genus *Helix*—contains seventy two plates of colored figures and four hundred pages of descriptive matter, and is prepared by Dr. L. Pfeiffer, who describes and figures upwards of

four hundred species, giving under the head of each species, its synonymy, bibliographical references to its literature, its geographical range and habitat, and the size usually attained. Furthermore the most remarkable variations are particularized and described, the volume being closed by a full alphabetical index to the species contained, the more widely known synonyms being included and italicized.



Journal de Conchyliologie, Oct., 1875.

FISCHER, P.—Note sur l'anatomie de l'*Helix dictyodes*, Pfeiffer (Note on the anatomy of *Helix dictyodes*), pp. 273—276.

This New Caledonian species proves to be a true *Helix*. The jaw is smooth, without median projection. The formula of the lingual dentition is 36—1—36, the teeth are all tricuspid. The reproductive organs are those of the typical *Helices*.

Figs. 3—6 of Plate XIV. illustrate this paper.

FISCHER, P.—Sur les *Pellicula depressa*, Rang, et *appendiculata*, Pfeiffer (On *Pellicula depressa* and *appendiculata*), pp. 276—277.

These two species prove to be distinct, Dr. Fischer describes and figures the shell of *P. appendiculata* (Pl. xiv. fig. 1), and of *P. depressa* (fig. 2), and describes the jaw and dentition of the latter species, those of the former having been described in the previous vol., p. 137. Both species are arboreal, and inhabit Guadeloupe.

FISCHER, P.—Note sur le genre *Cyllene* de Gray (Note on Gray's genus *Cyllene*), pp. 278—280.

Fourteen species were described in the monograph in Sowerby's Thesaurus, to which two others described by M. Petit—*C. Guillainii* and *Senegalensis*—must be added.

The true *Cyllene* inhabit the coasts of tropical Africa, and the

East Indian Archipelago. *Columbella bicanalifera*, Sowb., Galapagos, considered by Petit to be a *Cyllene*, does not belong to that genus, no more than *Buccinum granum*, Lamarck, from the Mediterranean, which is a *Nassa* and not a *Cyllene*. *Nassa obliqua*, Kiener, also referred by Petit to *Cyllene*, should remain in the genus *Nassa*.

MORELET, A.—Des genres *Erinna*, *Lithotis* et *Lantzia* (Of the genera *Erinna*, *Lithotis* and *Lantzia*).

In 1872, M. Jousseaume described in the *Revue Zoologique* a small terrestrial mollusc from Réunion under the name of *Lantzia carinata*, but in 1874 considered that the genus *Lantzia* = *Erinna*, H. & A. Adams. The shell of *Lantzia carinata* is almost identical with that of *Lithotis rupicola*, Blanford, from the Ghauts, but the animal appears different; that of *Lithotis* has no upper tentacles, whilst in *Lantzia* there are two, flattened and triangular.

MORELET A.—Description d'un nouveau *Bulime* de l'Algérie (Description of a new Algerian *Bulimus*).—p. 282.

B. Semannet, Mor., from Djurjura, Kabylia.

SOUVERBIE, DR.—Descriptions d'espèces nouvelles de l'Archipel Calédonian (Descriptions of new species from the New Caledonian Archipelago).—pp. 282—297.

Mitra Montrouzieri, Souv. (Pl. xiii. f. 1) I. Art; *M. suavis*, S. (fig. 2), Lifou, Loyalty Ids; *M. Lamberti*, S. (fig. 3), Lifou; *Pleurotoma (Cithara) onager*, S. (fig. 4), Lifou; *P. (C.) coniformis*, S. (fig. 5), Lifou; *P. carinulata*, S. (fig. 6), I. Art; *Odostomia rufula*, S. (fig. 7), Lifou; *O. pupiformis*, S. (*Pyramidelia pupiformis*, S. Journ. de Conchyl. t. xiii, p. 152, pl. 5, fig. 4.). The shell figured in vol. xiii was of very irregular growth owing to the shell having been broken, and afterwards mended by the animal, causing the formation of a second abnormal fold. The diagnosis and figure should be corrected, and the species having only one fold should be

referred to *Odestomis*, not *Tyramidella*; *Natica Gaidei*, Souv. (Pl. xii, fig. 8, operculum); *Turbo nonimus*, Souv. (fig. 9), I. Art; *Submarginula Lamberti*, Souv., (fig. 10), Lisou; *Subulima* (new genus) *Lamberti*, Souv., I. Nou.

SOUVERBIE, DR.—Description d'une espèce nouvelle appartenant au genre *Turbinella* (Description of a new *Turbanella*)—pp. 297—298.

T. crosseana, Souv. Locality unknown.

BAVAY.—Note sur la respiration des *Ampullaires* (Note on the mode of breathing of *Ampullariæ*), pp. 298—305.

The author considers the aerial respiration as the principal, and gives various details as to the use of the siphon and other points.

CROSSE, H.—Description de Nudibranches inédits, provenant de la Nouvelle-Calédonie, avec le Catalogue des espèces actuellement connues (Description of new Nudibranchs from New Caledonia, with Catalogue of the species known from that locality), pp. 305—322.

Doris Marici, Cr. (Pl. xii, fig. 1); *D. Rossiteri*, Cr. (fig. 2); *D. Fabrei*, Cr. (fig. 3); *Goniodoris Montrouzieri*, Cr. (fig. 4); *G. Verrieri*, Cr. (fig. 5); *G. Lamberti*, Cr. (fig. 6); *G. Petiti*, Cr. (fig. 7); *G. Souverbiei*, Cr. (fig. 8); *Bornella Caledonica*, Cr. (fig. 10); *Placobranchus Gassiesi*, Cr. (fig. 9).

CROSSE, H.—Note sur les genres *Bornella* et *Placobranchus* accompagnée du Catalogue des espèces actuellement connues (Note on *Bornella* and *Placobranchus*, with Catalogue of known species) pp. 322—328.

The author enumerates eight species of the former and ten of the latter of those genera of tropical Nudibranchs.

CROSSE, H.—Diagnosis *Planorbis* novi Antillarum incolæ (Diagnosis of a new West Indian *Planorbis*), p. 329.

P. Bavayi, Cr., from Guadeloupe. Near *P. cimex*, Moricand.

Palæontology, pp. 329—335.

CROSSE, H.—La Malacologie à l'Exposition du Congrès international des sciences géographiques (Malacology at the Exhibition of the International Geographical Congress).—pp. 336—338.

The principal objects exhibited, bearing on Malacology were:—

M. Vélains, collections at the Islands of St. Paul and Amsterdam, made during the Transit of Venus expedition

Land and freshwater shells of New Caledonia exhibited by M. Gassies (2nd class medal).

Maps of the geographical distribution of marine Moiliæ on the S.W. coast of France (2nd class medal) exhibited by M. Fischer.

Zoological plates, four containing illustrations of *Helices*, belonging to M. Grandidier's great work on Madagascar, and a series of microscopical shells exhibited by M. de Folin.

M. Crosse blames several points in the arrangement of the exhibition, M. Gassies' shells for instance having been placed at the end of the Tuileries Garden, amongst a lot of jams, pickles, etc !

Bibliography, pp. 338—359.

News, pp. 359—360. M. Crosse mentions that Dr. Gundlach has left Cuba, finding it impossible to continue his scientific explorations in consequence of the civil war which has been going on for the last six years, and that he is now exploring Porto Rico.

Journal de Conchyliologie, January 1876.

CROSSE, H. — Monographie du Genre *Rhodea* (Monograph of the Genus *Rhodea*), pp. 5—24.

This section was founded by Messrs. H. & A. Adams in 1858 for *Achatina Californica*, Pfr., and considered as a subgenus of *Columna*.

In 1873, M. Mousson described a second species, *R. gigantea*, from New Granada, and raised the section into a genus, a view soon generally adopted.

With regard to the place of the genus in the classification of the *Helicidae*, various opinions have existed.

As we have seen, Messrs. Adams considered that the *Rhodea* were intimately allied to the *Columnae*; but both by their forms and by their being ooviparous, whilst the *Columnae* are viviparous they are quite different, and this is confirmed by the geographical distribution of the two genera. *Columna* is a West African genus, is in fact merely a somewhat abnormally developed and elongated *Achatina*, whilst *Rhodea* is exclusively South American.

Dr. Kolekt places *Rhodea* next to *Megaspira*, also an exclusively South American genus and extremely elongated.

M. Crosse thinks that the genus we are considering should be placed next to *Spongura*. The first whorls are almost exactly the same as those of *S. octava*, L., and M. Mousson, who has examined almost embryonic specimens of *R. gigantea*, compares them with *Leptinaria* minus the parietal lamella, and *Leptinaria* and *Spongura* belong to the same family.

[As M. Crosse remarks, the study of the animal can alone definitely fix the position of the genus, but whilst admitting with the author that there are many points of resemblance between *Rhodea* and *Spongura* we cannot help also seeing an analogy with *Megaspira*. In our collection we have arranged the genera as follows, *Spongura*, *Spiraxis* (*s. stricta*), *Rhodea*, *Megaspira*, *Balia*, *Clausilia*. This seems to us to reconcile both views—*Rhodea* being in fact

regarded as forming the transition from *Solenites* and its allies to *Megamphix*. —C.P.G.]

M. Crosse then gives a revised diagnosis of the genus, and enumerates and describes the species.

1. *Rhodata Pfeifferi*, Crosse (Pl. I, figs. 1, 1a, and 1b). This is the *R. Californica* of Pfeiffer. The name *Californica* involves an error of locality, the species being really from New Granada. [There has been some discussion as to whether a geographical name found to be erroneous should be altered. M. Mörch in an article in the Malakozoologische Blätter says *not*, any more than a man named Armstrong or Schwartz has his name changed because he is weak or fair complexioned, but we are inclined to think that in cases such as the present, where from the rarity of the species the first name has not obtained a very wide circulation it is better to correct a glaring error. —C.P.G.]

R. Pfeifferi is the smallest species of the genus.

2. *R. gigantea*, Mousson (Pl. I, figs. 2, 2a, and 2b), as its name indicates, is the largest species, and at the same time it is that in which the generic characters are most strongly pronounced. It has been found near Bogota and Sonson.

3. *R. Walliniana*, Dohrn (Pl. I, figs. 3, 3a, 3b) was remarkable in its reversed shell. Its spire is more inflated than that of the other species, causing some resemblance to the *Clavilie* of the South American section *Nenia*.

MOUSSON, A.—Coquilles recueillies par M. le Dr. Sievers dans les contrées Transcaucasiennes (Shells collected by Dr. Sievers in Transcaucasia).—Notice II, pp. 24—51.

A supplement to the article in the number of the Journal for July 1873. Additional information is given as to species mentioned in the former article, and the following new species are described:—

Hyalina (*Mesomphix*) *semisculpta*, Mous. (Pl. II, fig. 1), Persian coast of the Caspian; *H. (Bruthida) septentrionalis*, (Pl. II, fig. 2), Samarkand; *H. (campylaea?) appeliana* (Pl. II, fig. 3), Kislovodsk, Caucasus; *H. (Macularia) Ghilanica*, (Pl. II, fig. 4), Ghilan, Persia;

Mulinopsis (Peltens) brevior, (Pl. II, fig. 5), rejectamenta of upper Araxes; *B. (Chondrus) diffusus*, (Pl. II, fig. 6), rejectamenta of the Araxes; *Pupa (Pupilla) superstrata*, (Pl. II, fig. 7), Laiisch, Government of Kutais; *P. (Pupilla) micaula*, (not figured), Mahmoudli; *Clavilina (Alinda) fusiformis*, (Pl. II, fig. 8), Ssori, Government of Kutais; *C. (Marpessa) Raddei*, Sievers, (Pl. IV, fig. 3), Mount Schambobel, 6000 feet high; *Cyclostomus caspicus*, Mous., (Pl. IV, fig. 2), Leitoran; *Vivipara (= Psilodina) Ceka*, Neldreich, (Pl. IV, fig. 1), Erzeroum.

FISCHER, DR. P.—Faune malacologique de la vallée de Cauterets, suivie d'une étude sur la répartition des Mollusques dans les Pyrénées (Malacological fauna of the Valley of Cauterets, and study of the distribution of the Mollusca in the Pyrenees).—pp. 51—84.

In the first part of this article Dr. Fischer gives a list of the species inhabiting the Valley of Cauterets; amongst the most remarkable being *Vitrina pyrenaica*, Fer.; *Helix Desmondi* Farines; *H. carascalensis*, Fer.; *Pupa Pyrenearia*, Mich.; *P. ringens*, Mich.; *P. bigorriensis*, Charp., (hardly more than a variety of *P. mugacheilas*); *Limnaea limnaea*, L., var. *glacialis*, Dupuy, found in the Lac de Gaube at an elevation of 1788 mètres; *Tomatia Partioti*, Moq.-Tandon; *Pholidium Casertanum*, Vol., var. *thermale*, Dup. He then distributes the species of the Pyrenees generally according to zones of altitude, characterising each zone by a species of *Helix*. It may be remarked that *Helix carinthia*, one of the most special Pyrenean shells does not extend above 1000 mètres (zone of *H. carthustana*). The highest zone, that of *H. carascalensis*, from 2000 to 2500 mètres and even higher, molluscan life appearing not to cease completely much before 2500 mètres, only contains two species, *H. carascalensis* and *Limnaea limnaea*, var. *glacialis*. Dr. Fischer gives three, but the third, *H. nubigena*, is only a variety of *H. carascalensis*.

The author then gives a comparative table of the Alpine species, and proceeds to discuss the general distribution of Mollusca in the Palaearctic province, illustrating his views by a map. He admits five regions:—

1. The Northern or Germanic—consisting of the basins of the

Arctic Ocean, of the Baltic, and of the North Sea.

2. The Western or Atlantic Region—Portugal, Western Spain, Western France, Cornwall, Wales, W. Ireland.
3. The Southern or Mediterranean region—consisting of the basin of that sea.
4. The Central or Pontic region—the basin of the Black Sea and of the Sea of Azoff.
5. The Eastern or Caspian Region—The basin of the Caspian.

It would lead us too far here to discuss this paper as fully as it deserves. Suffice it to say that even those who do not agree with all its conclusions, will find a mine of valuable information on the geographical distribution of the Palaeartic mollusca.

MORELET, A.—Sur quelques coquilles inédites ou imparfaitement connues des îles orientales de l'Afrique (Some new or imperfectly known shells from the Eastern African Islands).—pp. 85—91.

The following new species are described:—

Cyclotoma Dupontianum, (Pl. III, fig. 1), Madagascar; *C. defloratum*, (Pl. III, fig. 3), Bourbon (Réunion), subfossil; *Phenorbis Mauritianus*, (Pl. III, fig. 7), Mauritius. The opercula of several species are described. Those of *C. Philippinum*, Pfeiffer, and *C. Coquandianum*, Petit, prove those species to belong to *Otopoma*. *Cyclotoma citrinum*, Sowerby, thought by Dr. Pfeiffer to be from Trinidad, is really from Madagascar.

FISCHER, DR. P.—Description d'un Nudibranche inédit, provenant de la Nouvelle Calédonie, avec le catalogue des espèces du genre *Ceratosoma* (Description of a N. Caledonian Nudibranch, and catalogue of the genus *Ceratosoma*).—pp. 91—94.

C. Caledonicum, Fischer.

FISCHER, DR. P.—Note sur les *Helix Buvinieri*, Michaud, et *Asturica*, Pfeiffer. (Note on *H. Buvinieri* and *Asturica*).

Michaud's name *Buvinieri* applies to the same species as Pfeiffer's *Asturica* and being earlier must take priority.

CROSSE H.—Note complémentaire sur quelques espèces de Mollusques terrestres habitant l'île Kauai (Supplementary note on some land shells from Kauai, Sandwich Ids.).—pp. 95—99.

The late Mr. Pease had published in the Journal for 1870 diagnoses of some new *Achatinella*, but reserved the right of figuring them, intending to publish a general work on the shells of the Sandwich Islands, in which the figures were to appear. Mr. Pease's death having released the Editors of the Journal from their obligation, M. Crosse now figures the following, all described by Pease in 1870 :—

A. (Leptachatina) turgidula, (Pl. IV, fig. 5); *A. (L.) costulosa*, (Pl. III, fig. 4); *A. (L.) balteata*, (Pl. IV, fig. 4); *A. (L.) tenebrosa*, (Pl. III, fig. 5); *A. (L.) laevis* (Pl. IV, fig. 6); *A. (L.) antiqua*, (Pl. III, fig. 6), subfossil; *A. (Amastra) sphaerica*, (Pl. I, fig. 5); *A. (A.) rugulosa*, (Pl. I, fig. 4).

CROSSE, H.—Note complémentaire sur le genre *Heteroculus*, sur ses conditions d'existence, et sur la place qu'il doit occuper dans la méthode (Supplementary note on *Heteroculus*, its habits and its systematic position), pp. 99—100.

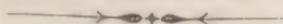
First thought perhaps to be terrestrial, and therefore placed by M. Crosse provisionally in the family of *Cyclophoridae*, this genus has turned out to be fresh-water, and should be included amongst the *Valvatidae*.

CROSSE, H.—Diagnosis of *Ampullaria Schrammi* from Cayenne.—p. 102.

Palaeontology, pp. 102—116.

Bibliography, pp. 116—135.

News, pp. 135—136. During Prof. Nordenskjold's Expedition, Dr. Skutberg found a *Physa* at Cape Schaitanskoi, the most northerly point where fluviatile molluscs have hitherto been met with.



Journal de Conchyliologie, April, 1876.

MOUSSON, A.—Coquilles recueillies par M. le Dr. Sievers, dans la Russie Asiatique (Shells collected by Dr. Sievers in Asiatic Russia).—3rd notice, pp. 137—148.

Reports the result of another journey made by Dr. Sievers in the mountains of Southern Transcaucasia during last summer.

The following new species and varieties are described:—

Heliacium Sieversi, Mousson (Pl. V, fig. 1); *Helix (Xeraphila) nemargo*, Krynicki, var. *obtusior*, M.; *Chondrus tricollis*, Mouss. (Pl. V, fig. 2); *Pupa (Vertigo) pygmaea*, Drap., var. *nitidula*, M.; *Claesilia (Mentissa) acuminata*, M., (Pl. V, fig. 4); *C. (Alinda) rizosifera*, M., (Pl. V, fig. 3).

FISCHER, P.—Remarques sur la synonymie et l'habitat de quelques espèces de Mollusques de la Nouvelle-Calédonie (Remarks on the synonymy and habitats of some species of New Caledonian Mollusca).—pp. 148—151.

Pedipes Jouani, Montrouzier, redescribed by Garrett as *P. subglobosus*.

Plectrema Souverbiei, Montr., redescribed as *P. turrita*, Garrett; inhabits Taviuni, Fijis.

Rissoina Montrouzieri, Souverbie, *Odostomia interstriata*, Souv., *Rissoina incerta*, Souv., *Pleurotoma scutata*, Souv., all described by Garrett as *R. supracostata*, *O. densecostata*, *R. terebra*, and *Cithara melanostoma* respectively.

Fleurotoma apiculata and *nigrocincta*, Montrouzier, have also been found at the Andaman Islands.

Columbella lactescens, Souverbie, found by Messrs. Nevill at Ceylon.

Trichus fossulatus, Souverbie, found at the Andamans.

Trichus Lamberti, Souverbie, previously described by Messrs. Nevill as *Talloritis resoluta*, from Ceylon.

TAPPARONE-CANEFRI.—Rectifications dans la nomenclature de quelques espèces du genre *Scalaria* (Corrections of the nomenclature of some species of *Scalaria*).—pp. 152—156.

Scalaria simillima, Tapparone, = *S. principalis*, Sowerby nec Pallas.

S. Fischeriana, T.-C., = *S. unicostata*, Sowb., nec Orbigny.

S. microsoma, T.-C., = *S. attenuata*, Sowb., nec Pease.

S. jacunda, T.-C., Dr. Tapparone Carefri does not admit the genus *Constantia* and consequently changes the name of *Constantia elegans*, A. Adams, to *jacunda*, as the *elegans* has already been used several times in the genus *Scalaria*.

Scalaria Carpenteri, T.-C., = *S. variegata*, Carpenter; changed on account of *S. raricosta*, Lamarck.

S. (Psychrosoma) Gouldi, T.-C., = *Opalia borealis*, Gould, nec Beck.

S. (P.) Crosseana, T.-C., = *Opalia bullata*, Carpenter; must be changed unless *Pydrionina* be raised to the rank of a genus, as there is a *S. bullata*, Sowerby, (1844).

S. (P.) erronea, T.-C.; figured by Sowerby as *S. Mörchi*, Angas, which it is not.

Cirsotrema Kieneri, T.-C., = *S. decussata*, Kiener, nec Lamarck.

FAGOT.—Observations sur la Faune malacologique de Cauterets, P. Fischer (*Observations on Dr. Fischer's malacological Fauna of Cauterets*).—pp. 156—158.

Replies to certain observations made by Dr. Fischer, in his article in the previous number, on the Catalogue of the Mollusca of the Higher Pyrenees published by Fagot and de Nansouty. M. Fagot states that he has himself found *Carychium minimum* up to a height of more than 1100 mètres, after a few other corrections he adds that *Pomatia concolor* extends to about 1900 mètres, not to 1200—1500, only, as stated by Fischer; that *Pupa pyrenearia*, var., or perhaps a distinct species, has been found by General de Nansouty at the Col de Senteurs (2600 mètres), that the specimens of *Helix cornuta* found on the Pic du Midi are as small as those of the

Valley of Cauterets, the larger form is found near the Lake of Oncet; and that *Zonites incurvus* has been found near Bagnères-de-Bigorre.

GLOYNÉ, C. P.—Note additionnelle sur l'*Helicina bicincta* (Additional note on *H. bicincta*).—p. 159.

The description given at p. 47, vol. xx, of the Journal is corrected from a more adult specimen since obtained, and the shell is figured, (Pl. V, fig. 5).

MORELET, A.—Note complémentaire sur le *Bulimus Semannei* (Supplementary note on *B. Semannei*).—pp. 160—161.

Additional particulars respecting this species, described by M. Morelet in vol. xxiii of the Journal, p. 282. It may be identical with *B. Bourguignati*, Letourneux, described in 1870—1, and if so Letourneux's name will have priority, but in that case the figure of *B. Bourguignati* given by Letourneux must be incorrect in several particulars. *B. Semannei* is figured (Pl. IV, fig. 7).

GUPPY, R. J. L.—Sur l'existence du genre *Haliotinella* aux Antilles (The presence of the genus *Haliotinella* in the West Indies).—pp. 161—163.

The genus *Haliotinella* was proposed by Dr. Souverbie in the Journal for 1875, (vol. xxiii, p. 3) for a testacelliform shell from New Caledonia, whether terrestrial or marine was not exactly known. Mr. Guppy has now discovered a second species at St. Kitts, and as it was found in sand, with marine shells, considers it to be marine. He proposes the name *patinaria* for the species, but does not give a formal description.

CROSSE, H.—Sur une variété nouvelle du *Voluta musica*, L., (A new variety of *V. musica*).—pp. 163—166.

The new var. *polypleura*, Crosse, of this well known species is distinguished by the absence of the well known music-like lines and of the black spots on the outer side of the peristome, by the presence of numerous costulations in the space between the large

longitudinal ribs, and of several distinct furrows in the sutural region of the whorls. Locality unknown (Pl. V, fig. 6).

CROSSET, H.—*Diagnoses Molluscorum novorum* (*Diagnoses of new Mollusca*).—pp. 166—167.

Lucina Schrammi, from Guadeloupe and *Ennea Dupuyana* from the Comoro Islands.

CROSSET and FISCHER.—*Diagnosis Helicis novae, insulae Madagascari dietae incolae* (*Diagnosis of a new Helix from Madagascar*)—pp. 167—168.

Helix Scanniahomi, intermediate between *H. lata* and *H. seychellensis*.

Paleontology,—pp. 168—180.

Bibliography,—pp. 180—214.

News, pp. 214—216. The vessel on board of which were the collections of Signor de Albertis, made in New Guinea, was shipwrecked and all the collections lost, except six packages, afterwards picked up by another ship.

Mr. Jeffreys is preparing a report to the Royal Society on the results of his dredgings in the Arctic Regions on board H.M.S. "Valorous."

A scientific expedition is about to be fitted out in Norway to dredge between the North Cape and Spitzbergen.

M. Terver has bequeathed his collections of shells to the Natural History Museum of Lyons.

C. P. G.

Rossmassler's Iconographie der Europaischen
Land und Susswasser Mollusken.

Fortgesetzt von Dr. W. KOBELT.

Rossmassler's Iconography of the European Land and Fresh
water Mollusca, continued by Dr. W. Kobelt.

Vol. IV, Part 1, pp. 12 and 5 plates, (1875).

Parts 2—4 in one— pp. 32 and 15 plates, (1876).

Wiesbaden, C. W. Kreidel. Price with plain plates, 5 marks 60
pfennigs each part, with coloured plates, 8 marks.

We desire particularly to call the attention of English conchologists to this work, of which we are able to speak in all respects in terms of unqualified praise. Rossmassler's work, of which the publication was interrupted 18 years ago, was intended to furnish figures and descriptions of all species of extra-marine mollusca inhabiting Europe and the other regions making up the Palaeartic Province, but the three volumes published only illustrated about 800 out of 1700 known species. Dr. Kobelt now begins a set of supplementary volumes intended to illustrate and describe not only all species and varieties not contained in Rossmassler's work, but additional figures of forms insufficiently illustrated, so that the whole work will form a most thorough and detailed account of the Palaeartic Molluscan Fauna.

The descriptions and figures do not follow in systematic order, various groups being taken up as opportunity offers, but Dr. Kobelt's Catalogue remedies any inconvenience that might arise from this.

The species are treated in a masterly manner, and with no tendency to an unnecessary multiplication of their number, and here it must be observed that Dr. Kobelt is quite as ready to perform summary execution on his own species as on those of others, when further investigation has shown them to be untenable. Whilst the number of species is thus judiciously restricted, every variety and subvariety is described and figured, of *Helix desertarum* there are 12 separate forms figured, and we regard this not as a superfluous luxury, but as a most valuable aid in the identification of specimens, and contrasting very favourably with many English works on Con-

chology. As Dr. Kobelt remarks, the partisans of the multiplication of species have only to strike out the word "var." in cases where they consider the forms thus described to be species, to make the work suit their views.

The parts already published are devoted to the illustration of various species of *Helix*, especially of the subgenus *Campylaea*. The following may be mentioned as worthy of special notice. *Helix atroalbata*, *Pouzolzi* (a remarkable dwarf variety) *trizona* (a whole plate of illustrations), *desertorum* (more than a plate of figures), *turcica*, *Megadorensis*, *megrabina*, *lucorum* (a whole plate), *Buchii*, *pachya*, *ligata* (several varieties), *fætens* (3 vars.), *planospira* (a whole plate), several of the hirsute *Campylaea*, *cingulata* (nearly 2 plates), *cyclolabris* (several vars.), *Möllendorffii*, *Velascoi*, *cantabrica*.

The last plate contains figures of some species of *Zonites*, but the corresponding text has not yet appeared.

If we turn to the material execution of the work, we find equal reason for approval. The form, very small 4to, is in our opinion much more handy and convenient than the large size of Reeve and other "ouvrages de luxe": each part is enclosed in a case or portfolio, thus guarding against the risk of injury to which works issued in loose sheets and plates are generally exposed; the plates are excellently drawn, (by the accomplished wife of the author,) and well colored, as we have ourselves ascertained by the comparison of several figures with specimens. We regard this last point as very important for unless a plate be really, well and accurately coloured it had better, in our opinion, be left plain, as bad colouring is only misleading.

We would advise all conchologists who take an interest in the European fauna, or in any portion of it, to procure this work—It may be as well to mention that though the remarks are in German, the descriptions of species and varieties are in Latin.

We hope we may be allowed to express a wish to see the first three volumes of Rossmässler re-issued, as they are now out of print, and it would be very desirable to be able to obtain the complete work.

C. P. G.

SPECIES *VERSUS* VARIETIES.

By G. SHERRIFF TYE.

In your issue for Aug. 1875, I read my friend Mr. Simpson's paper under the above title, and as there are several statements therein calculated to mislead the student of conchology, I venture in a spirit of friendliness to point them out.

Dr. Gwyn Jeffreys' axiom—"Groups to deserve the name of species must be distinct from others ; because, if any of them are so intimately blended together by intermediate links, so as to make the line of separation too critical, the test fails, and a subordinate group, or what is called a 'variety' is the result"—is a fair groundwork to build upon, but it is scarcely to be expected but that Conchologists will differ from the author of 'British Conchology' as to what is "too critical" a separation, for as no absolute line can be drawn, the best master can only guide the student by an expression of his own opinion. Dr. Jeffreys' remark that "every naturalist is at perfect liberty to follow the bent of his own discretion or inclination in the extension or reduction of species, subject only to the opinion of his scientific compeers" must be read with the context, and it will then be seen that the author is uttering a mild protest against there being no "arbiter specierum" to whom when in doubt or difficulty a naturalist could apply; hence Mr. Simpson somewhat perverts the sense of it, because Mr. Jeffreys does not speak of this proceeding of naturalists as a "right" but as a "liberty" taken by them in the absence of a properly constituted authority.

I proceed to follow Mr. Simpson's reasoning, taking the genus *Succinea*. We must bear in mind that in describing a shell an author endeavors to use language which will guide the tyro to the *style* of the shell he wishes to call his attention to, hence, in describing *Succinea elegans* Dr. Jeffreys says that its variety *ochracea* "forms a passage to" *S. oblonga*; but this is not saying that it is not distinct from *S. oblonga*, surely it does not follow that because one species "leads" to another that therefore it *belongs* to it, or following this reasoning we might have but one species of *Succinea* in the world.

for without doubt, links exist connecting the extreme forms, and in determining a species we have to examine correlative forms widely spread over a geographical region.

Dr. Jeffreys' remarks about the *Pisidium*—“size, substance, sculpture, and lustre are not of much account”—without doubt apply only to that genus, and are used ironing the determination of a species. Thus we have *P. fontinale* and its four varieties varying much in all these qualifications, yet they all belong to one species; at least this is the opinion of a master of the science who has examined “thousands of specimens” collected from all parts of Europe.

Next the *Zonites*—all our species are well marked and I cannot admit that the distinctions between any of them are “very trifling.” The two approaching nearest to each other are *Z. alliarius* and *Z. glaber*, but the latter is much the largest and has a smaller umbilicus than *alliarius*, this latter character being very striking in continental specimens which I have examined. *Z. pusus* and *Z. radiatulus* are certainly very distinct and preserve their character, although often occurring together, and we cannot dispute the identity of a species because “the lens” is a necessary vehicle to its proper examination, or we might as well dispute the distinctness of all microscopic organisms of infinitely greater difficulty of examination.

Helix nemoralis and *H. hortensis*, although occurring together, * are not considered by Dr. Jeffreys to be distinct, or, as we might put it, *Helix nemoralis* is found in company with another form—*H. hortensis*, with which it is connected by the variety *hybrida*, i. e., not preserving its distinctive character, but intermingling with *hortensis* and producing intermediate forms; on the other hand, if the two forms never occurred together they would have to be regarded with suspicion, being so nearly alike, as constituting a species and variety; and it is this reasoning Dr. Jeffreys applies to the var. of *Limnaea palustris* (p. 114)—as it occurred *alone* it was to be regarded as a local variety, whereas, had it occurred with other forms and still maintained its character without intermingling, it would have had some claim to specific distinction. Of course this is a rule to be

* Dr. Jeffreys is certainly aware of the fact of the two forms occurring together and mentions the circumstance in the 5th volume of his excellent work.

applied, with others, as an assistance in determining a species, but it is not *absolute*, nor is any rule which can be laid down. I have tried to explain the grounds upon which Dr. Jeffreys has proceeded in joining *H. nemoralis* and *H. hortensis* together, but I must here record my belief in their distinctness.

Mr. Simpson asks—speaking of *Helix hortensis*—how is it that the variety becomes permanent? Do not all shells (mollusks?) follow the same laws as other animals in returning back to the original, or in throwing off other varieties which differ from the variety itself as much as it differs from the typical species?" Now "varieties are of two kinds—*permanent* and *local*"—the former are distributed throughout the country, the latter are confined to one spot or district; as "permanent" forms we may quote *Unio tumidus* var. *radiata*, *Anodonta anatina* var. *ventricosa*, *Limnea peregra* var. *intermedia*, and *Helix caperata* var. *ornata*; as "local" we may take *Unio pictorum* var. *compressa*, *Anodonta anatina* var. *complanata*, *Limnea peregra* var. *picta*, and *Helix virgata* var. *carinata*.

There is abundant evidence to shew that some species of mollusks are more subject to variation than others, as among the higher animals, and it is this tendency to vary which would make "confusion more confounded" by attempting to name varieties.

I must confess I am surprised at Mr. Simpson finding specimens of *Helix rufescens* and *H. hispida* "exactly alike" and should like to see examples. It seems to me, that the liquid epidermis—at all stages of its growth—of the latter and its smaller size (excluding all other characters) form prominent features of distinction not to be mistaken.

As to whether the separation of *Helix concinna* and *H. hispida* is "too critical" or not, I must say that I think it is.

The differences between *Clausilia biplicata* and *C. laminata* are decisive—no such distinctive characters obtain with the vars. of *Carychium minimum*. Again, the difference between *Cochlidium tridentum* and *C. lubrica* cannot possibly be considered as "slight" as that between the variations of *C. minimum*. The latter varies, it is true, but the same general character runs through all the variations, and they are all so intimately blended that it would be useless to attempt to name any of them, I have examined numbers of the American

form (*C. exiguum*, Say), and although the extreme forms differ, I cannot see any grounds for separating it from *C. minimum*.

The grounds for uniting our two species of *Cochlicopa* in one genus, are as good as those for uniting so many varied forms of *Bulimus* or *Helix*, there is no essential difference between these creatures and *Bulimus*, and it would be proper to place them in that genus, I think, but of course this is a matter of opinion.

The important malacological difference between *Bala* and *Clavigilia* is sufficient warranty for placing them in distinct genera.

I quite agree with Mr. Simpson touching the two species of *Planorbis complanatus* and *cornutus*. I have often tried, but always failed, to find any grounds for separating them. I also think with him, that the decollation of a shell clearly cannot make it a variety, and I can give undoubted proof that it is produced by circumstances beyond the control of the mollusk.

Helix virgata monst. sinistrorsa near Pollington.—Whilst shell collecting between Gisèle and Askern, in the beginning of September, 1875, I found amongst others, the following local species. Fine specimens of *Helix front* occurred plentifully on an hedgebank between Snaith and Pollington. At Balne Moor I found my greatest prize, a perfect, sinistral specimen of *Helix virgata*, as well as a number of *Helix coprata* of a perfectly white color, some of which were beautifully marked with translucent bands.

Limnaea peregra var. albida near Askern.—On May 15th 1875 whilst engaged in examining the various ponds and ditches situated between Askern and Doncaster, I discovered a number of specimens of *Limnaea peregra* of a very clear white color, they were readily distinguished from the normal form, while in the water, as they appeared to be of a very light bluish-grey color. Dr. Jeffreys to whom I have submitted them says "the *Limnaea peregra* is an interesting (and I believe new) variety corresponding to the variety *albida* of *Limnaea auricularia*."—Lister Peace, 1875

SPECIES VERSUS VARIETIES.

By C. P. GLOYNE.

The subject of the discrimination of species and varieties having been under discussion in the pages of this Journal on two occasions lately, I beg to offer a few remarks that have occurred to me.

I would first observe that neither of the gentlemen who have taken part in the discussion, appear to have distinguished a *variety* from a *monstrosity*. The divergence of an individual from the normal form from pathological causes is always designated by the latter name. It would be as reasonable to make a var. *conjuncta* of the human race for the Siamese twins or a var. *pusilla* for Tom Thumb astocallasinistral specimen or a commonly dextral shell var. *perversa*. Still more is this the case when the malformation is not even congenital, but has been produced during the lifetime of the animal. This at once disposes of such cases as the var. *decollata* of *Lymnea stagnalis* proposed by Mr. Simpson.

Leaving aside these monstrosities however, we have many instances of true variation where it is difficult to draw the line between individual variation, varieties and distinct species and there is by no means a concurrence of opinion amongst naturalists as to where to fix the limits. As those who have followed the foreign literature of the subject are aware, a certain party amongst French conchologists, "la nouvelle école", carry the subdivision of species to about the furthest limit possible, short of making a species out of every specimen. M. Bourguignat is the leader of this school, which started an organ called the "Annales de Malacologie," which however was very short lived. Dr. Kobelt in a note to his excellent Catalogue of European Land and Fresh water shells observes if all the genera were to be treated as this school has treated the genus *Cimella*, the list of European shells would soon reach the dimensions of a dictionary. I need scarcely add that these extravagances are repudiated by the really leading conchologists of France such as M. M. Crosse and Fischer. This "nouvelle école" has furthermore distinguished itself by the use of Greek derivations for specific

names, contrary to the generally accepted rule that generic names only are to be taken from the Greek, and inflicting upon naturalists a number of such jaw-breaking words as "*sclerotricha*" "*apalolena*" etc., notwithstanding that it ought to have been known that one of the great hindrances to the spread of zoology is the terror such names inspire amongst those who are thinking of taking up the subject.

Before the doctrine of evolution was promulgated, the definition of a species was easy, it was then said to consist of all the individuals descended from an originally created pair, but now such a definition can no longer stand, and a species can only be considered as "true" for a limited period of time. We therefore must regard the difference between a species and a variety as one of degree rather than of kind, and from that point of view, Dr. Kobelt's definition appears to me to be about the best I have seen. He regards as distinct species such forms as can be readily distinguished one from another, without the necessity of comparative measurements, and without the aid of some indication of the locality, and it should also be added without intermediate gradations. This must at the same time be acknowledged to be rather an empirical test, than a statement of what actually constitutes a species in nature.

In my opinion the true difference between a species and a variety will be found to consist in the production of perfectly fertile hybrids by the latter—I do not make this statement in a pre-Darwinian sense. I believe for instance that *Equus caballus* and *Equus asinus* are simply modifications of a primitive *Equus*, but I regard that point of differentiation at which two forms are no longer capable of mutual reproduction, or only of the production of infertile hybrids, as securing the perpetuation of the two forms, and this giving them the range of species.

Varieties are well defined as "incipient species". Divergence is beginning, and may if circumstances favour lead to the production of a distinct species.

An intermediate class might here be introduced for variations dependent on some local peculiarity of soil etc., affecting all the individuals within range of the circumstances, but ceasing when the

cause is removed, e.g., the var. *tenuis* of *Helix aspersa* found in places poorly provided with carbonate of lime—like the Channel Islands. I do not consider that this variation would ever develop into a distinct species.

We now have reached the lowest degree—that of individual variation. This varies considerably in different species. In *Helix picta* it is great, one may have some dozens of specimens and not two exactly alike in colour and markings. In some of the *Neritinae* there is even greater diversity; in the largest suite of specimens it would be difficult to find any two between which some slight difference would not be detected. Other species on the contrary are remarkable for the almost perfect similarity of all the specimens. I once had over 50 specimens of the Porto Rican *Clausilia tridens*, and to use a common expression they were all as "alike as two peas". This was accounted for in my opinion by the West Indies being an unfavourable climate for *Clausilia*, and the same causes that have prevented the genus extending itself then have kept the single species true to its original form.

When individual variations are also malformations due to pathological causes they are termed "monstrosities".

In the practical application of these rules to particular cases, there will often be a diversity of opinion, especially as it is not always possible to test hybridity by actual experiment. Especially with regard to the marine mollusca there would be almost insuperable difficulties to doing this in most cases, and it is for this reason that in my opinion a practical, though empirical test like that laid down by Dr. Kobelt becomes valuable.

Mr. Simpson's illustrations of *Clausilia biplicata* and *laminata* was certainly—as pointed out by Mr. Marshall—a most unfortunate one. Not only are these species most readily distinguishable, but they belong to quite different subgenera.

That characters have varying importance according to circumstances is a well known and recognized fact, and must be the case in a natural classification, which is founded not on particular organs arbitrarily taken as the basis of arrangement, as the pistils and stamens in the Linnean botanical arrangement, but on the general

affinities of the forms, as shown in their whole structure. There is therefore nothing astonishing in the fact that differences which in some cases are taken to constitute species, are in others considered varietal only. Color for instance which in some species is eminently variable, is in others perfectly constant.

ON SPECIES OF MARINE SHELLS FOUND ON THE COASTS OF SOUTH AUSTRALIA.

By GEORGE FRENCH ANGAS, F.L.S., C.M.Z.S., F.R.G.S., &c.

Mr. W. T. Bednall has reprinted in Adelaide, my list of the Marine shells of the Province of South Australia, which appeared in the Proceedings of the Zoological Society of London for 1865, at which period the number of known species amounted to about 236 univalves and 97 bivalves. Consequent upon his researches since I left the province, Mr. Bednall has been enabled to add several additional species to the list, thus bringing up the total number of species to about 358.

Murex Angasi, Crosse, hitherto known only as coming from New South Wales, he gives as from Port Lincoln.

A *Fusus* sp? from the Semaphore beach.

A new *Epidromis* (*E. Bednalli*, Brazier), from Guichen Bay.

Blueaternum lacteum, Reeve, from Port Elliot and Port Wallaroo.

A variety of *Nassa suturalis* Lam., from Port Lincoln; and

Nassa Jacksoniana, Kiener, from the Semaphore.

Melo Miltonis, Gray, from Fowler's Bay.

Amalda marginata, Lamk., from Port Lincoln and the South coast.

Mitra pica, Reeve, from Port Elliot, and Kangaroo Island.

Opalia australis, Lamk., (a New South Wales species), from the South coast.

Himurilla scutella, Gray, from Guichen and Holdfast Bays.

Microchisma Tasmaniæ, from South-East coast.

Emarginula Tasmaniæ, Sow., and

Emarginula dilecta, A. Ad., from Guichen Bay.

Lepidopleurus antiquus, Reeve, Aldinga Bay.

Mr. Redhall also gives *Lorica cimolia* of Reeve as coming from South Australia; I have never met with it except in New South Wales; he may have confounded it with *Lorica Angasi*, H. Ad., which I discovered at Rapid Bay.

His final addition to the univalves is *Merinula xanthostoma* of H. & A. Adams.

Amongst the bivalves is *Aspergillum Strangei*, a very rare Port Jackson shell, which he has obtained in St. Vincent's Gulf.

Two species of *Veneridae*, viz.: *Marcia levigata*, Sow., and *Tivela undulosa*, Lam.

Single valves of a *Trigonia* from the Semaphore Beach, which he gives as *T. margaritacea*, Lam.

A *Limopsis*, ? *Belcheri*, from Guichen Bay; and a species of *Placanomia*, not identified, from Henley Beach.

ANALOGOUS AFRICAN AND WEST INDIAN SPECIES OF *MARGINELLA*.

By F. P. MARRAT.

AFRICA.

Marginella Keenii, *Marrat*,
Port Elizabeth.

M. quadrifasciata, *Marrat*.

M. Dunkeri, *Krauss*, and vars.

WEST INDIES.

Marginella pellucida, *Pfeiffer*,
= *diaphana*, *Kiener*.

M. tæniata, *Sow.*

M. zonata, *Kiener*, and vars.

DESCRIPTION OF A NEW SPECIES OF *FUSIONELLA*.

By F. P. MARRAT.

Fusionella recurvirostris, n. s.

Pus. testa elongato-fusiformi, acuminata, ad basin recurva, intus extusque livido-olivacea, anfractibus superne declivibus, apicem versus plicatis et subnodosis, ceteris levibus, politis, apertura ovali, labri limbo laevi.

Hab. Cape Blanco, West coast of Africa.

ON THE HABITS OF *HELIX FUSCA*.

By CHARLES ASHFORD.

On Christmas day a few winters ago I was walking with some friends through Salliam Wood, three miles from Plymouth, when I noticed two individuals of *H. fusca* upon the herbage of the bank. As the weather was cold I was rather surprised to find this species abroad while its more thickly clad congeners were hibernating below the surface. The temperature fell considerably during the next few days, and I visited the spot repeatedly to find, if possible, the limit to the endurance of this slender mollusk. The following notes from my memoranda at the time will best show the result. Dec. 26th—the thermometer at early morning registered 26° and the herbage was fringed with sparkling crystals of rime, notwithstanding which the little creatures were abroad and lively, crawling up the blades of the Great Hairy Woodrush (*Luzula sylvatica*) not simply indifferent to a temperature which benumbed my own extremities but positively agile. Dec. 27th—min. temp. 28°. Dec. 28th—min. temp. 28°. This morning *H. fusca* still about and vigorous. Dec. 29th—temp. 25°. Dec. 30th—temp. 22°. After an hour's search I

found only one individual. Dec. 31st, temp. 26° —None to be seen. The frost continued without intermission throughout the first week of the new year, during which time on the occasion of two visits to the same and neighbouring spots I failed to find it about, nor could I discover any at the roots of the *Luzula*. Jan. 9th—Milder. *H. fuscum* again abroad, and more abundantly on the 10th.

It appears then that a continuance of a temperature below freezing-point for six successive days was necessary to drive to its retreat a mollusk protected by a shell so thin as to be almost membranous, and that on the slightest return to warmer weather, the circulation of the animal sufficiently increased to enable it to resume activity. I unfortunately neglected to note the number of pulsations of the systems per minute.

It is somewhat singular that another thinly-clad snail, *Vitrina pallidula*,—a tenant, by the way, too large for the house it occupies and therefore still less protected than *H. fuscum*—retires from only severe cold. It may be found almost any part of the winter during mild weather and I have noticed it even crawling over frost-covered leaves. I want to know more about *H. fuscum* and shall be glad to compare notes with other observers as to its winter habits. Is it usually the case that it does not hibernate for the season? Upon what plants does it generally feed? When it retires, does it bury itself, or remain near the surface? Though very generally distributed (according to our authorities) I must confess to having met with it in only two localities. I hope some of your correspondents will record in your pages the result of their observations of this species.

NOTE ON THE SYNONYMY OF *PLANORBIS GLABER*, (JEFFREYS).

By WM. NELSON.

In 1840, Dr. J. E. Gray—in his work entitled “A Manual of the Land and Freshwater Shells of the British Islands”—speaking of *P. levii*, Alder, remarks upon its similarity to *P. peregrinus*, Say.

Dr. Jeffreys in the 1st vol. of "British Conchology" says it is the *Planorbis larvus*, Alder, and probably the *P. cornu*, Ehrenberg, the *P. Kermayeri*, Auerwaldi, and that Dr. E. von Martens is of the opinion that it is also the *P. gyrinus* of von Seckendorff. In the 5th vol. of "British Conchology" he adds *P. arcticus*, Möller and probably *P. sibiricus*, Dunker.

In 1872, Dr. Jeffreys in his article "The Mollusca of Europe compared with those of Eastern North America" confirms the identity of *P. parvus*, Say with *P. glaber*, Jeff.

Having lately received from Mr. H. Hemphill of California, U.S., specimens of *Planorbis (Gyratulus) vermicularis*, Gld, from Oregon. I find them to be identical with well grown specimens of *P. glaber*, Jeff., from Sutton Park, Birmingham.

The name *Planorbis parvus*, Say, has the priority and may necessitate a change that will be somewhat inconvenient to British conchologists who have become familiar with the name given to it by our great leader in the science Dr. Jeffreys.

THE MOLLUSCA OF SANTA ROSA ISLAND, CALIFORNIA, U. S.

By LORENZO G. YATES.

Santa Rosa is one of the chain of Islands forming the southerly side of what is known as "The Santa Barbara Channel," on the coast of California, about 300 miles South of San Francisco. The Island was formerly thickly inhabited by a race of Indians now extinct.

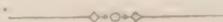
The following list includes the mollusca found living, and those used by the aborigines for food and ornament, collected by the writer during a recent expedition to the Island, in search of antiquities for the Smithsonian Institution.

The species marked × were used for food; those marked * for ornaments and money; and those marked † were used for paint cups and probably for food.

- Pholadidea penita, *Conr.* Cardium corbis, *Mart.*
 " ovoidea, *Gld.* × " quadragenarium, *Conr.*
 Parapholas Californica, *Con.* " blandum, *Gld.*
 Sicyaya pholadis, *L.* * Liocardium elatum, *Say.*
 Glycimeris generosa, *Gld.* Lazaria subquadrata, *Cpr.*
 Cryptomya Californica, *Conr.* Lucina Californica, *Conr.*
 Solenothærus Nuttalli, *Conr.* Diplodonta orbella, *Gld.*
 Thracia curta, *Conr.* " " var.
 Intodesma saxicola, *Baird.* Kellia Laperousii, *Desh.*
 Mytilimeria Nuttalli, *Conr.* " suborbicularis, *Mont.*
 Solen acutus, *Gld.* × Mytilus Californianus, *Conr.*
 Macoma Volgiformis, *Cpr.* < Septifer bifurcatus, *Roe.*
 " nasuta, *Conr.* Modiola modiolus, *Linn.*
 " inquinata, *Desh.* Adula falcata, *Gld.*
 Tellina Hodgeni, *Hds.* Lithophagus plumula, *Hanl.*
 Lutricona alta, *Conr.* Aximæa intermedia, *Brod.*
 Cumingia Californica, *Conr.* " septriionalis, *Midd.*
 Standella planulata, *Conr.* Pecten hastatus, *Sby.*
 Pachydesma crassatelloides, *Cd.* " " var. Hindsii, *Cpr.*
 Psephis tantilla, *Gld.* † " aequisulcatus, *Cpr.*
 Chione succincta, *Val.* " latiauritus, *Conr.*
 " simillima, *Sby.* * Hinnites giganteus, *Grav.*
 Tapes staminea, *Conr.* × Ostræa lurida, *Cpr.*
 " " var. orbella *Cpr.* Succinea rusticana, *Gld.*
 Saxidomus gracilis, *Gld.* Helix Ayresiana, *Newe.*
 " aratus, *Gld.* Physa Gabbii, *Tryon var.*
 " Nuttalli, *Conr.* * Dentalium Indianorum, *Cpr.*
 Rupiliaria lamillifera, *Conr.* Mopalia muscosa, *Gld.*
 Petricola carditoides, *Conr.* × Ischnochiton Magdalensis, *Hds.*
 Chama exogyra, *Conr.* Nacella incessa, *Hds.*
 " pellucida, *Sby.* " pulchra, *Cpr.*
 " spinosa, *Sby.* Acmaea patina, *Esch.*

- × *Acmaea persona*, *Esch.*
- × " *scabra*, *Nutt.*
- " *spectrum*, *Nutt*
- " *crebrifilatum*, *Cpr.*
- " " var.
- † *Lottia gigantea*, *Gray.*
- Scurria mitra*, *Esch.*
- Rowellia radiata*, *Cooper.*
- ×
- Fissurella volcano*, *Rve.*
- Glyphis aspera*, *Esch.*
- * *Lucapina crenulata*, *Sby.*
- Clypidella bimaculata*, *Dall.*
- ×
- Haliotis Cracherodii*, *Leach.*
- ×
- " *corrugata*, *Gray.*
- * " *rufescens*, *Sw.*
- Phasianella compta*, *Gld.*
- " " var. *pulloides*,
- * *Pomaulax undosus*, *Wood.*
- Leptothyra sanguinea*, *Cpr.*
- " *bacula*, *Cpr.*
- " " var.
- ×
- Trochiscus Norrisii*, *Sby.*
- ×
- Chlorostoma funebrale*, *Ad.*
- " " var. *subapertum*, *Cpr.*
- ×
- " *brunneum*, *Phil.*
- " *aureotinctum*, *Ibs.*
- Calliostoma canaliculatum*, *Mrt.*
- " *costatum*, *Mart.*
- " *annulatum*, *Mart.*
- " *gemmaulatum*, *Cpr.*
- " *splendens*, *Cpr.*
- Margarita acuticostata*, *Cpr.*
- Crepidula dorsata* var. *lingu-*
lata, *Gld.*
- ×
- " *adunca*, *Sby.*
- " *navicelloides*, *Nutt.*
- " " var. *explanata*, *Gld.*
- Hipponyx cranioides*, *Cpr.*
- Serpulorbis squamigerus*, *Cpr.*
- ×
- Cerithidea sacrata*, *Gld.*
- Bittium filosum*, *Gld.*
- " *quadrifilatum*, *Cpr.*
- " " var.
- " *asperum*, *Cpr.*
- Litorina planaxis*, *Nutt.*
- " *scutulata*, *Gld.*
- " " var.
- Lacuna variegata*, *Cpr.*
- " *unifasciata*, *Cpr.*
- * *Luponia spadicea*, *Sw.*
- * *Trivia Californiana*, *Gray.*
- * " *Solandri*, *Sby.*
- Erato vitellina*, *Hds.*
- Drillia inermis*, *Hds.*
- " *mœsta*, *Cpr.*
- " *torosa*, *Cpr.*
- " " var. *aurantia*, *Cpr.*
- Mangelia variegata*, *Cpr.*
- " *interlirata*, *Sts.*
- Mitromorpha aspera*, *Cpr.*
- ×
- Conus Californicus*, *Hds.*
- Odostomia gravida*, *Gld.*
- Chemnitzia tenuicula*, *Gld.*
- Scalaria tincta*, *Cpr.*

<i>Scularia gracilis</i> , <i>Sby.</i>	Purpura siccicola, var. emarginata, <i>Desh.</i>
<i>Cerithiopsis tuberculata</i> , <i>Mont.</i>	Monoceros engonatum, <i>Conr.</i>
<i>Lunatia Lewisii</i> , <i>Gld.</i>	" " var. spiratum, <i>Blainv.</i>
<i>Lamellaria Stearnsiana</i> , <i>Dall.</i>	" " lapilloides, <i>Conr.</i>
<i>Mitra maura</i> , <i>Swo.</i>	Ocinebra lurida, <i>Midd.</i>
<i>Nolvarina varia</i> , <i>Sby.</i>	" " var.
<i>Olivella biplicata</i> , <i>Sby.</i>	" " interfossa, var. atropurpurea, <i>Cpr.</i>
<i>Nassa fossata</i> , <i>Gld.</i>	" " var. muricata, <i>Coop.</i>
" <i>perpinguis</i> , <i>Hds.</i>	" " var. clathrata.
" <i>mendica</i> , <i>Gld.</i>	" " intertexta, <i>Stearns.</i>
" <i>Cooperi</i> , <i>Fbs.</i>	Nitidella Gouldii, <i>Cpr.</i>
<i>Amphibisso corrugata</i> , <i>Rve.</i>	Muricidea fasceolata, <i>Hds.</i>
" " var. <i>versicolor</i> , <i>Dall.</i>	Fusus geniculus, <i>Conr.</i>
<i>Purpura canaliculata</i> , <i>Duc.</i>	Anachis penicillata, <i>Cpr.</i>
" " <i>saxicola</i> , <i>Val.</i>	
" " var. <i>fuscata</i> , <i>Fbs.</i>	



THE CONCHOLOGICAL CLUB, LEEDS.

We have the gratification of being able to announce the successful establishment of a working Conchological Club in Leeds. Its meetings are held fortnightly on Thursday evenings, throughout the year. The Club consists not only of resident members, but also of non-resident corresponding members who contribute regularly by letter and specimens to the work of the society.

The aims and objects are the advancement of conchological science by the exhibition of specimens and the communication of information relating to every department of the science, whether anatomy, physiology, distribution, classification or economy. Taking one of these objects for example, geographical distribution, we

notice the satisfactory and systematic way in which its investigation is commenced, with feelings of pleasure.

Geographically, the endeavour is, in the first place, to work out the conchology in detail of the county (Yorkshire) in which the town is situated; for this purpose the county is divided into a number of subdistricts based upon the river basins and watersheds, and also upon the geological structure and topographical configuration of the ground. At the end of every season will be published in a tabular form a list of the shells exhibited, and showing at the same time to what extent the shells of each subdistrict have been worked at. This will also show what are the deficiencies in the records for each subdistrict—a point which it is often as necessary for the investigator to know as the converse is. We cannot too heartily approve the principle of naturalists working their own districts in a systematic and detailed manner.

In the second place it is intended to exhibit and place on record shells from all other parts of the British Isles and of the world at large and ultimately it may be desirable to adopt some modified plan of tabulating the results in this direction also.

While this is being done for geographical conchology every other department is intended to be taken up at the meetings.

We have no doubt that assistance will be welcomed and are quite sure that any information will be furnished by the officers of the Society, or by the Secretary W. D. Roebuck, Esq., 9, Sunny Bank Terrace, Leeds.

Ancylus fluviatilis var. *gibbosa*, (Bourguignat), near Leeds.—In 1862, I found characteristic specimens of this well marked variety, adhering to conervoid covered stones in a shallow rivulet near its source, in a dense portion of a wood at Thorner, near Leeds.

On recently revisiting the locality I was pleased to find this interesting form still existing in the same place—W. NELSON.

BIBLIOGRAPHY.

"Descriptions of five new species of Land-shells from Madagascar, New Guinea, Central Australia, and the Solomon Islands.—By Henry Adams, F.L.S., and George French Angas, C.M.Z.S., F.L.S., &c.

P.Z.S., 1876, pp. 488—490 and plate xlvi.

Helix malantensis (figs. 1, 2, 3). Malanta Islands, Solomon Archipelago.

A trochiform species, differing from *H. Guadalcanarensis*, Cox, in being more conical, the aperture smaller, with the outer lip much less flattened and expanded, as well as by the absence of the black margin at the angle of the reflexion, behind the outer lip, and the purple spot on the columella, and in having the base broadly stained and zoned with chesnut.

Helix Comriei (figs. 4, 5). Shores of Huon Gulf, South-east New Guinea.

This is allied to *H. Brumeriensis*, Verreaux, but is smaller, without the black lip of the latter. Dr. Comrie also obtained several specimens of *H. Brumeriensis* at the same place, only known hitherto by the single specimen in the British Museum, collected by the late Mr. J. Mc. Gillivray at Brumer Island, during the voyage of H.M.S. Rattlerake in 1849.

Helix rapillardii (figs. 6, 7). South-west Madagascar.

Helix fenerensis (figs. 8, 9). Feneri Island, north-west Madagascar.

Helix eyrei (figs. 10-12). Shores of Lake Eyre, Central Australia.

This species belongs to the group of dimorphy Helices from the arid regions of South Australia to which, Arthur Adams gave the name of *Angasella*, and to which *H. cyclophlebia*, Ver., and *H. Phillipsiana*, Angas, also belong.

Notes on the Sub-generic character of *Helix Jamaicensis*, Chem., and on certain Terrestrial Mollusks from Haiti; with description of a New Species of *Helix* from Colorado.—By Thomas Bland.

Reprinted from the Annals of the Lyceum of Nat. Hist., New York, vol. xi, June, 1875, pp. 146—154.

A new species of *Helix* is described in this important paper—*Helix Ingersollii*, from Colorado.

Helix (Thelidomus) Jamaicensis, Chem. This species has the same form of jaw and dentition as *H. aspera* and *H. discolor*.

Von Martens gives it as the type of *Lischila*, but it has the same form of jaw and dentition as *H. aspera* and *H. discolor* and belongs to *Thelidomus*. *Lischila* must therefore be placed in its synonymy. *Helix picta*, Born, which he associates with *Jamaicensis*, has the same type of jaw and dentition as *H. muscarum*, Lea, the type of *Polymita*; *H. picta* therefore will belong to same subgenus.

A new var. of *H. Jamaicensis* is described, differing from the usual form in its more laterally produced aperture, the columellar margin being oblique with a very broad callus, having 2 or 3 denticles across its edge, showing in this respect alliance with *H. aspera*. It usually has a small tooth on the parietal wall.

Helix (Euryzona) oblitterata, Fér. Owing to the discovery by Mr. V. P. Parkhurst of a dead specimen of this species near Port au Prince, Mr. Bland is disposed to think that Haiti may be its true habitat. *Helix angulata*, Fér. of Porto Rico is a geographical var. of this species.

Helix intusplicata, Pfr. Found numerously near Port au Prince by Mr. V. P. Parkhurst. It is synonymous with *H. Smithiana*, Pfr., which was found on Mount Platon, thirty miles north west of Any Cays and described by Pfeiffer from specimens sent by Mr. Bland.

Helicina Cumingiana, Pfr. This species is recognised by its well

developed striæ, subangular periphery, &c. Pfeiffer was unacquainted with the habitat. Sowerby and Reeve both assign it to St Domingo under the name of *Cumingii*, Mr. V. P. Parkhurst found one dead specimen near Port au Prince, Haiti.

At or near Port au Prince, Mr. Parkhurst also found *Cyclotus floccosus*, Shuttl., *Cyclostomus Aminensis*, Pfr., *Chondropoma serraticostata*, Wein., *Helicina rugosa*, Pfr. and *Paivana*, Pfr., *Helix pubescens*? Pfeiffer, *crispata* and *indistincta*, Fér., *cepa* Müll., *Cylindrella gracilisyllis*, Fér., *Muricorinus Kusterianus*, Bld., and some species not yet determined and believed to be new.

Helix (Microphysa) Ingersollii, n. s. Discovered by Mr. E. Ingersoll in various localities on the S. W. of Colorado. At Howardsville, Baker's Park, it was abundant in wet places on the mountains 9,300 ft. above the sea. The finest specimens were found at Cunningham Gulch, clinging to the almost vertical face of a trachyte cliff, at an elevation of 11,000 feet, found also on the Southern Slopes of the Saguache Mts., on the Las Animas and Laplata Valleys, it inhabits similar stations to the *Succinea*. According to Mr. Binney the jaw is of the same type as *H. Lansingii*. It can scarcely be compared with any known N. A. species.

Geostilia Gundlachi, Pfr. Dr. van Rygersma who has had an opportunity of examining the animal, describes it—"as having four tentacles, the 2 lower ones very small and scarcely perceptible, the upper thick, cone elongated, without any black spot, indicating eyes. The animal is of a citron color, the foot long and narrow.

The species was described as *Achatina Gundlachi* by Pfr. in 1850. Von Martens places it in *Acicula* (subgenus of *Cionella*), Arango in *Cacilianella*, Bourg. and M. Crosse in *Geostilia*. The dentition is of the same type as *Cacilianella acicula* and *Stenogyra hasta*, Pfr. The ribs of the jaw are similar to those of *H. Lansingii*. It is a widely distributed species, occurring in Cuba, Jamaica, Haiti, St. Thomas, St. Martin and Barbadoes. A closely allied if not identical species has recently been found in Guadeloupe by M. Marie.

Notes on certain Terrestrial Mollusks, with description of a New Species of the genus *Amphibulima*.—
By Thos. Bland.

Reprinted from the Annals of the Lyceum of Nat. Hist., New York, vol. xi, November 1875, pp. 197—200.

In this paper 2 new species are indicated—*Amphibulima Rawsonis* from Island of Montserrat, W. I., and *Helix Van Nostrandi* from South Carolina.

Helix (Caracolus) Sagemon, Beck. The occurrence in Haiti of this species gives further evidence of the faunal connection of Haiti and Cuba. The most important identical species common to both islands are *Helicina rugosa*, Pfr., *Succinea ochracina*, Gundl., *Zonites Gundlachi*, Pfr., *Helix Boothiana*, Pfr., *Monteaurina*, Pfr., *vortex*, Pfr., *Oleacina oleacea*, Fér., *Strophia striatella*, Fér., *microstoma*, Pfr., *Macroceramus Gundlachi*, Pfr., *Cecilianella Gundlachi*, Pfr., *Stenogyra hasta*, Pfr.

The author considers that *Helix Arangiana* of Poey is a variety of *Helix Sagemon*,—a view in which the author of the species acquiesces—and that *H. Gaskoini*, Pfr. is also referable to it, and not to *Helix bizonalis*.

Helix (Cepolis) cepta, Müll. Prof. Linden found at Port au Prince living examples of the var. *minor* of this species.

Liguus virginicus, L. Prof. Linden found shells of this species inhabited by living *Paguri*, on Gonave Island, “moving about briskly in an old pasture, at a distance of two miles from the nearest sea beach.”

Bulimus Bahamensis, Pfr. Prof. Linden found at Port au Prince, the same variety that Mr. Sargent collected at Great Inagua.

Amphibulima Rawsonis, Bland. Allied in form to *A. pardalina*, Guppy, of Dominica, but very distinct from *A. patula*, and *rubescens*. Discovered at the Island of Montserrat (W. Indies) by Sir R. W. Rawson to whom the species is dedicated. With it was found species inhabiting the neighbouring islands, *H. Josephinae*, *B. exilis*, *Helicina Guadaloupensis*, and *picta*.

Helix (Trinotopsis) Van Nostrandii, Bland. Found at Aiken, South Carolina, it is nearly allied in form and character of aperture to *Helix introferens*. It connects *introferens* and *vultuosa* with, but is quite distinct from *fallax*.

Notes on American Land Shells and other Miscellaneous Conchological Contributions. By W. G. Binney.

Reprinted from the Proc. Acad. Nat. Sci. of Philadelphia, U. S., vol. 2, part 3, pp. 140—254 and 21 plates.

The first portion of this highly interesting and important paper is devoted to the consideration of the jaws and lingual membranes of the Terrestrial Pulmonates of North America and embodies the results of Mr. Binney's labors during the last 30 years in this department, in which he has gained such great celebrity.

The best methods of procedure to extract the jaw and lingual membrane from the animal with the least trouble and without injury to its most delicate portions is given in full detail and the position and mode of action of these organs clearly pointed out.

Mr. Binney thinks that the two organs considered in conjunction furnish a good basis for classification, and from the results of an examination of a number of American and foreign species of Terrestrial Pulmonata, he divides the whole series of known species into two great divisions, characterized by the absence or presence of a jaw. The following genera belong to the first great division, they being deficient of that organ: *Testacella*, *Daudibardia*, *Streptaxis*, *Rhytida*, *Diplomphalus*, *Glandula*, *Streptostyla*, *Strophostele*, *Gonospira* and *Ennea*, all of which are also deficient of lateral teeth, some genera being without centrals, but all have aculeate marginal teeth. The following genera of which the dentition is not actually known are also placed in the first division: *Stribellia*, *Ptenia*, *Spiraxis*, *Ravenia*, *Cæliaxis*, and *Gibbus*.

The genera *Onchidium*, *Onchidella*, *Peronia*, and perhaps *Buchanania* also form a group of the first division, characterized by their

quadrate marginal teeth.

The second division is distinguished by the presence of a jaw, and we find in this division also the same grouping of genera into those with quadrangular and those with aculeate marginal teeth.

The following genera possess teeth of the aculeate type: *Limax*, *Ilyicus*, *Parmacella*, *Tementia*, *Mariella* ?, *Parmarion*, *Dendrolimax*, *Phosphorax* ?, *Urocyclus* ?, *Vitrina*, *Vitrinoidea*, *Vitrinopsis*, *Nanina*, *Stenopus*, *Vitrinococonus*, *Macrocyelis* and *Zonites*. The remaining genera have quadrate marginal teeth, and are subdivided into three sections which are divisible by the character of the jaw, which is either in one single piece, one single piece with an accessory upper quadrangular piece, or in numerous pieces.

Those genera belonging to the first subdivision—with the jaw in one single piece—are formed into groups based on the absence, presence and peculiarities of the ribs of their jaw. But these divisions are not perfectly satisfactory, owing to the variability of these characters.

Of the genera without ribs are—*Philomyces*, *Parmella*, *Oopelta*, *Anaderus*, *Sagda*, *Patula*, *Polymita*, *Hemitrochus*, *Helicodiscus*, *Acarus*, *Corilla*, *Caryodes*, *Panda*, *Labyrinthus*, *Caracollus*, *Leucocroa*, *Cysticopsis*, *Plagiptycha*, *Leptoloma*, *Anostoma*, *Anostomella*, *Timigerus*, *Beyia*, *Nectonoma*, *Myosidoma*, *Achatinella*, *Chrysilia*, *Stenogyra*, *Strophia*, *Bulininus*, *Balea*, *Pupa*, *Vertigo*, *Ferussacia*, *Cecilianella*, *Geostilbia*, *Azeca*, *Tornatella*, *Zospeum*, *Holapira*, *Eucobodium*, *Celcozentrum*, *Lithotis*, *Rhaea*, *Megaspira*, *Limicolaria*, but one species has a ribbed jaw, *Achatina*, *Pseudachatina*, *Perideris*, *Columna*, *Bulimus* which however as now constituted has various forms of jaw.

The genera of the second subdivision have decided stout ribs on the jaw and are the following:—*Arion*, *Ariolimax*, *Prophysaon*, *Pallifera*, *Veronicella*, *Binnea*, *Hemphillia*, *Helix*, *Geomalacus*, *Edwardsinia*, *Peltula*, *Xanthonyx*, *Simpulopsis*, *Pfifferia*, *Berendtsia*, and some species now included in *Bulimus*, *Cochlostyla*, *Buliminus*, and *Limicolaria*.

The genera *Gastropus*, *Amphilulima*, *Bulimulus*, *Cylindrella*, *Macroceramus*, *Pineria*, *Partula*, forming the third subdivision, have

the jaw with separate delicate ribs, usually oblique.

The genera whose jaw is in one piece with an accessory quadrate piece, are *Succinea*, *Omalomyx*, *Hyalimax*, and *Athoracophorus*.

Orthotilus, *Liguus* and *Punctum*, have the jaw in separate pieces.

Then follows a dissertation on the value of the jaw and lingual membrane for purposes of classification and an arrangement of the North American Pulmonata in accordance with the scheme advocated of which the foregoing is an epitome.

Journal de Conchyliologie, July, 1876.

WATSON, Rev. R. B.—Note sur les coquilles terrestres communes à Madère et à d'autre contrées, considérées au point de vue de la distribution des espèces (Note on the land shells common to Madeira and other countries, considered from the point of view of the distribution of the species), pp. 217—232.

33 land and freshwater shells are common to Madeira and other localities; 146 being peculiar. Six of the 33 species are confined to one or two gardens, etc., and are certainly foreign to the island; 6 others are also probably recent importations; 7 others were probably introduced about the period of the first settlement of the islands; 4 species were probably imported independently of man; 2 are rather doubtful; 8 only can be considered indigenous to Madeira, and common to it and other localities. The marvellous speciality of the Madeiran fauna is thus seen. Putting aside the imported and the doubtful species, only 8 out of 154 truly Madeiran shells are found in other localities.

FISCHER, Dr. P.—Description d'un nouveau genre de Coquille des mers de la Chine (Description of a new genus of shells from the China seas), pp. 232—235.

The new genus, *Hoplites*, is remarkable for wing-like pro-

jections from each side of every whorl, it is considered to be allied to *Scalaria*. One species *H. Terquemi*, of almost microscopic dimensions, is described and figured (Pl. ix).

FISCHER, DR. P.—Descriptions d'espèces nouvelles de l'Afrique occidentale (Descriptions of new species from West Africa) pp. 236—240.

Murex hoplites, (Pl. viii, fig. 5), Goree, near *M. saxatilis*, L.; *Area despecta*, (fig. 1), hitherto confounded with *A. Noæ*, L.; *A. Bourieri* (fig. 2), Cape de Verdes and Guinea, something like *A. pacifica*, Sow.

MORLET, L.—Notes sur quelques Mollusques terrestres et fluviatiles de l'Alsace (Note on some land and freshwater mollusca of Alsace) pp. 240—241.

The author indicates some omissions in Hagenmueller's Catalogue. [Some of the species—*Zenites Dutaillyanus*, Mabille, and *Hydrobia Charpyi*, Mab.—are probably only varieties or synonyms.]

LATASTE, F.—Sur les troncatures successives d'un *Helix aspersa* en forme de corne d'abondance (The successive truncations of a cornucopia-shaped *Helix aspersa*) pp. 242—246.

A cornucopia-shaped *H. aspersa* had been picked up in a vineyard, but had lost the top of its spire though careless carriage, the animal having formed a partition at the top to exclude the air. Gradually more and more of the spire was broken off, and new partitions were formed. One day in taking up the mollusk it fell out of its shell, was replaced in it, and is now as well as ever. A portion of the liver had been removed when the shell was first broken, and this was never renewed.

Palaeontology and Bibliography, pp. 247—308.

Correspondence, pp. 308—310. A letter from Mr. Wollaston is published, giving an account of the fauna of St. Helena. Mollusca are very few, especially in the higher regions, but Mr. Wollaston believes that he has added 5 new species to the list—the common European *Itelix pulchella*, a small *Patula* probably *pusilla*, a small *Hyalinia*, undetermined, a reddish *Limnea*, and finally a magnificent new *Bulimus*, of which most of the specimens were dead, but one or two were living. M. Crosse conjectures that this may be the *B. auris-vulpina*, known as subfossil from St. Helena since the time of Chemnitz, but never before found alive.

Journal de Conchyliologie, October, 1876.

CROSSE & FISCHER.—Mollusques fluviatiles recueillies au Cambodge par le Mission scientifique française de 1873 (Fluviatile mollusca collected in Cambodia by the French scientific expedition of 1873), pp. 313—342.

This expedition was rather archaeological than zoological, nevertheless naturalists were attached to it—MM. Jullien and Ratte—and made collections in a part of the basin of the Mekong hitherto unexplored. A list of 43 species is given. *Paludina Frauenfeldi*, Desh., is altered to *P. Rattei*, on account of *P. Frauenfeldi*, Morelet, having priority. *Paludina Cambodjensis*, Mabille & Le Mesle, and *P. Chalanguensis*, Desh., are probably the same; the former name would have priority. The new genus *Pachydrobia* is proposed for *Pachyrhynchus partus*, Lea, from Siam, and a new species, *P. paradoxus*, Cr. & F., (Pl. x, fig. 3) from sandbanks in the Mekong. *Unio (Arconiaia) Delaportei*, (Pl. x, fig. 1, and Pl. xi, fig. 5) and *Pseudodon Harmandi* (Pl. x, fig. 2) are described as new; the former is a most remarkable species, having one side of the valves prolonged into a beak. *Pseudodon (Monocaudulus) fumidus*, Desh., is renamed *P. Moreleti*, on account of an older

P. tumidus, Morelet.

Some general considerations follow : the most striking feature of the fauna is the abundance of the genus *Paludina*, of most varied forms. The genus *Pachydobia* and *Lacunopsis* are peculiar to this region. *Canidia* is found, a freshwater *Buccinum* [see Dr. Brot's paper], a fact not without example in other groups. The genus *Pseudodon* attains its maximum, and the *Unionide* generally are remarkable. *Corbicula* is very well represented.

BROT, A.—Note sur les genres *Canidia* et *Clea*, avec la description de deux espèces nouvelles (Note on the genera *Canidia* and *Clea*, with descriptions of two new species), pp. 343—353.

These two genera have hitherto been placed among the *Melanidae*, but the examination of the radula proves them to belong to the *Buccinidae*. The median plate has seven denticulations in *Canidia* and ten in *Clea*, the lateral has 3 stout teeth in both genera, the external tooth being extremely large and much curved. Eleven species of *Canidia* and two of *Clea* are enumerated ; *Canidia tenuicostata* (Pl. XII, fig. 5), and *C. Beauforti* (fig. 6), both from Siam, being described as new.

MORCH, O. A. L.—Révision des Mollusques terrestres des îles Nicobars (Revision of the terrestrial Mollusca of the Nicobars) pp. 353—367.

35 species are enumerated, a mere fragment of what may be expected from the Islands. The following are new: *Nanina Roepstorffii* near *N. Frauenfeldi*, *N. lepharynx* near to *N. Timorensis*, *Uflex microtrichus*, *Bulinus* (rather *Stenogyra*) *Roepstorffii*, *Cyclophorus polynema*. The author mentions that in almost all the species, two forms, a larger and a smaller, have been met with, and that the larger was found by the old collectors, whilst the smaller occurs now. He attributes this to a diminution in the

humidity of the climate.

MORCH, O. A. L.—Note sur le *Scutus abnormis*, G & H. Nevill, pp. 367—8.

This turns out to be a dorsal valve of *Pholas Siamensis*, Spengler. *Patella acinaces*, Lea, is probably also a valve of *Pholas*.

MORCH, O. A. L.—Description d'espèces nouvelles (Descriptions of new species), pp. 368—376.

Trophon Ieniglini, Arctic Ocean, *Fusus Pjatii*, Greenland & Spitzbergen, *Fusus productus*, Beck in coll., Cape North, North Pacific, *Iopsis Gabbii*, Porto Rico, *Odostomia torcula*, St. Thomas, W. Indies, *Psammobia Circe*, Tortola, *Scintilla eburnea*, St. Thomas, W. Indies, *Turricula Rawsoni*, West Indies, probably Barbadoes.

MORELET, A.—Description de trois *Helices* du Maroc (Description of three *Helices* from Morocco), pp. 374—6.

H. finitima, *conopsis*, and *Mareccana*.

SOUVERBIE, DR.—Description d'espèces nouvelles de l'archipel Calédonien (Descriptions of new species from the New Caledonian Archipelago), pp. 376—381.

Mitra fusus (Pl. xiii, fig. 3, 4), *M. brevicula* (fig. 5), *M. adumbrata* (fig. 6), all from Lifoa, *Subeulima Lamberti* (fig. 2), I. Nou.

SOUVERBIE, DR.—Descriptions d'espèces nouvelles (Descriptions of new species), pp. 382—383.

Turbinella Crosseana (Pl. xiii, fig. 1), locality unknown, *Scatenostoma apiculatum*, Mauritius.

CROSSE and FISCHER.—Description d'espèces nouvelles provenant du Guatemala (New Guatemala species), pp. 383—384.

Streptostyla Sargi (Pl. xi, fig. 1), *Melania Sargi* (fig. 4).

CROSSET, H.—Description de deux espèces nouvelles (Descriptions of two new species), pp. 387—389.

Emea Dupuyana (Pl. xi, fig. 2) Comoro Ids., *Planorbis Bayai* (fig. 3), Guadeloupe.

Under the head of correspondence and news, the discovery of *Amphibulima patula* at Marie Galante and of *Trigenia acuticostata* in Bass' Straits are noticed.

C. P. G.

Rossmassler's Iconographie,

Fortgesetz von Dr. W. Kobelt.

Lieferungen 5 and 6. (See Q. J. C. p. 169).

The fifth and sixth parts (in one) of this work have lately appeared, and continue to maintain the high standard of the former numbers.

The fine species of *Zonites* figured in the last part are described, and we may here remark that the British species called *Zonites* by Jeffrey, etc., really belong to *Hyalina*—shown by anatomy to be a distinct genus.

After another plate of *Zonites*, we have in this part some very fine species of the subgenus *Pentatenia*, including *H. platycheila*, *Rosalia*, *atlascica*, *Beaumieri*, and *Xanthodon*.

Of *H. planata*, the type and the beautiful variety *erythrostoma* are figured; we then have *H. Dehni*, a species only known for a long time from a single specimen found amongst guni arabic, but lately collected in large numbers in Morocco by Drs. von Fritsch and Rein, and the series of *Helices* is closed for the present by a curious variety of *H. Pisana*.

The next five plates are devoted to species of *Unio* and *Anc-*

den, including some very beautiful and new South European forms, e.g., *U. Fiscallianus*, *Requieni* var. *romana*, *Blauteri*, *Ksibianus*, *Penchinatramus*, *A. idrina* and *Debettana*.

This double part concludes the first volume.

We have one slight criticism to make and are almost glad of it in order to prove that the praise we have bestowed on this work is due to honest appreciation, and not to indiscriminate flattery. We think that the advertisement of certain of Herr Kreidel's other publications would have been better loose, or else printed inside the cover, instead of being paged with, and thus forming part of the text of Dr. Kobelt's work.

C. P. G.

Deutsche Excursions Mollusken-Fauna.

By S. Clessin.

Parts 1—3, Nurnberg. Bauer and Raspe. 1876.

Price 2 marks 50 Pfgs. [2/6] each part.

We must confess to a certain feeling of disappointment at the scope of this work.

By taking the new "Reich" with the addition of Bohemia only, as the limit of the fauna, instead of the old "Bund," the author has lost the most productive and interesting districts, especially Tyrol, Styria, Carniola and Carinthia, whilst Alsace-Lorraine, Schleswig and the Eastern Prussian Provinces which are added, contain hardly any, if any, species not also found within the limits of the Bund. We merely mention this to prevent others from experiencing the same disappointment as ourselves, and not as any blame to Herr Clessin, who has naturally the right of publishing such fauna as he chooses.

The author in his introduction offers a few general remarks on the object of the work, gives very interesting, and to the collector useful, details of the habitats and mode of life of the land and fresh-

water mollusca, and some serviceable hints on the collection and preparation of shells.

The descriptive part follows, every species being described—both animal and shell—followed by information as to its station, and its distribution both within and outside of Germany.

The synonymy is purposely shortened as much as possible, only the citation of the original description, references to some figures, and to any published accounts of the anatomy, with one or two other quotations, being given. Each species is illustrated by a woodcut, giving a view of the shell from above, from below, and sideways.

The subject of variation is treated in an original, and by no means bad manner. Differences in size and colour are described, but those of form only are named.

Almost all the British species are included in the German Fauna, *Helix virgata* and *Pisana* being perhaps the most striking exceptions, whilst the following German genera and sub-genera are absent in England, *Daudabardia*, *Triodopsis*, *Potasia*, *Eulota*, *Campylaea*, *Zebra*, *Chondrula*, *Oreula*, *Pugnulima*, *Delima*, *Fusulus*, *Grassularia*, *Trigonostoma*, *Strigillaria*, *Pomatias*, and *Lithoglyphus*.

Most of the other genera and sub-genera are represented much more largely in Germany, *Xerophila* being about the only exception, but at the same time, with the exception of the species of the Bavarian Alps and of the Danube, the general character of the fauna is very similar to the English.

The land shells are very well treated, and we have no fault to find with the author's appreciation of species. In the freshwater shells, on the other hand, we think he refines too much. It is impossible for instance to look at the figures of *Bythinella Dunkeri* and *cylindrica*, or of *Planorbis complanatus* and *Clessini* without the strongest doubts as to the distinctness of the species.

The figures are on the whole fairly drawn, though sometimes rather rough. It is only right however to take into consideration

the low price of the work, which must be commended as a very useful guide for conchological excursions in Germany. C. P.G.

Zusatze und Berichtigungen zu meinem Catalog der im Europaischen Faunengebiet lebenden Binnenconchylien (Additions and corrections to my Catalogue of the extra-marine shells of the European faunal region).

By Dr. W. KOBELT.

(Jahrbucher der Deutsch. Mal. Gesellschaft, iv., pp. 14—45.)

Dr. Kobelt had published a first supplement to his Catalogue in 1873; he now prints another and more extended one.

The principal alterations are the following:—

A subdivision of the region is now admitted—the provinces being the Arctic, the Boreal, the Germanic, the Alpine, and the Mediterranean, the latter being divided into six circles, the Moorish, the South Italian, the Dalmatian, the Greek, the Asia Minor, and the Syro-levantine.

Many species are added, principally from the Balkan peninsula and the Caucasus, *Campylaea*, *Buliminus*, *Pupa*, *Clausilia*, *Neritina* and *Uva* having received particularly numerous additions. On the other hand a considerable number of the species of the catalogue have been struck out, as being varieties or synonyms.

The subgenus *Leptaxis* is removed from the European Fauna, the species referred to being transferred to *Macularia*. *Helix* *sicana*, *platycheila*, and *Nebrodensis* are transferred to *Iberus*, and *H. (I.) minoricensis* to *Macularia*.

A new subgenus, *Xeroleuca*, is proposed for *H. turcica*, etc. The toothless species of the subg. *Chondrula* are formed into a new subgenus, *Mastus*, Kob. The species of *Pupa* of subg. *Torquilla* from *Farinesi* to *Sardca* now constitute the subg. *Modicella*, Adams. It is not pretended to give a final revision of the difficult genus *Clausilia*, but the following alterations are suggested: Subg. *Melora*

divided into four; *Medora* gen. s. stricto for the blue Dalmatian species, *Siciliaria* for the Sicilian, *Albinaria* for the white Greek shells, and *Cristataria* for the Syrian. Most of the Syrian species under *Idyla* should also be transferred to *Cristataria*. The species under *Marpessa* from *succineata* Zgl., to *capillacea* Rossm., form the subgenus *Dilataria* Vest. *cincta*, *guineae*, *procera*, and *turgida* constitute the group *Uncinaria* Vest. The subgenus *Serrulina* Mousson, is admitted for certain Transcaucasian species—*serrulata* Mous., *Sieversi* Pfr., etc. Westerlund's list of the European species of *Planorbis* is given.

187 names are added to the list of synonyms, Bourignat alone being accountable for 53 of these, next to him Bénoit and Parreyss' names are the most frequent.

This supplement is indispensable to all engaged in the study of European shells, and is prepared with the care that always distinguishes Dr. Kobelt's publications. We would advise all readers of the "Quarterly Journal of Conchology" to purchase copies of the Catalogue and Supplement, and thereby hasten that very desirable event, the publication of a second edition of the Catalogue embodying all corrections and additions to date.

C. P. G.

DESCRIPTION OF A. NEW SPECIES OF *CONUS*.

By EDGAR A. SMITH, F.Z.S.,
Zoological Department, British Museum.



Conus cuneiformis,

Testa turbinata, superne subacute angulata, solida, sordide albida, nitida, sub lente transversim minutissime striata, et sulcis dis-

tantibus validis (superne vix conspicuis, basin versus conserioribus) insculpta; spira leviter concava, apice acutiuscula et fuscescens; anfract. 9 planiusculi, paululum exerti, striis spiralibus 3-4 incrementique lineis ornati; apertura angusta, intus violacea; labrum intus margine albidum, superne vix incisum; columella basi subuplicata.

Long. 25 mill. Diam. max. 14.

This species is of a turbinate form, with a slightly concave and not very elevated spire; the angle of body whorl is rather acute and its sides almost rectilinear or slightly concave. It is of a whitish colour faintly tinted with purple, the spire particularly towards the apex is stained with pale brown and the interior of the aperture is light violet; the spire consists of nine very gradually increasing whorls which are a little exserted and sculptured with three or four fine spiral striae which are crossed by very minute arcuate lines of growth; the last whorl also shows incremental striations and minute transverse ones and is sculptured with transverse sulcations which are rather remote and almost obsolete on the upper third of it, much closer together towards the base, on the oral side of which is a rather distinct columellar fold. The aperture is narrow, scarcely wider at the base than superiorly; the labrum which within on its margin which is not prominent in the middle but nearly straight and only faintly incised at its juncture with the whorl.

There are two specimens of this interesting species in the National Museum which form part of the magnificent Cumingian collection; unfortunately no locality is attached to them.

This species must not be confounded with *C. trochulus* of Reeve, its nearest relation. It is a little more elongate, narrower at the base, with straight or even concave and not convex outlines as in that species; the spire too is slightly concave, more pointed and brownish at the apex, and the transverse sulcations are well

developed on two-thirds of the body-whorl, which is more sharply angled, whereas in *C. trechulus*, there are only a few well-marked sulci at the base. The whorls of the spire of the present species are slopingly flattened and slightly elevated one above another and finely spirally striated, whereas in Reeve's species they are concave or furrowed in the middle, not exserted or only very slightly so and do not show any distinct spiral striation.

DESCRIPTIONS OF NEW SPECIES.

By F. P. MARRAT.

Nassa Smithii, n. s.

N. testa ovato-oblonga, subsutisfermi, crassa, albida, fasciis tribus fuscis ornata; anfr. 8-9, convexis, apicalibus levibus, costulis numerosis, subnodosis, in anfractu ultimo granulatis, ad suturas moniliformibus; labro extus valde incrassato, intus; lirato columella arcuata, polita, unimaculata, valde verrucosa, superne uniplicata.

Hab. ?

I name this shell after my conchological friend, Mr. Edgar A. Smith, Zoological Department, British Museum.

Natica caffra, n. s.

N. testa subobteo umbilicata, oblique depressa, spira brevi; anfractibus rotundatis, juxta suturas impressis, undique dense striatis, albida, flammulis aurantio-fuseis subdistantibus longitudinaliter picta, anfractu ultimo in medio unifasciata.

Hab. Corisco Bay, West Africa.

Natica (Mamma) faba, n. s.

N. testa oblongo-ovata, solida, alba, epidermide tenui fuligineo insuta, spira obtusa, anfractibus declivi convexis, obscure plicato striatis; columella callositate solida columnari umbilicam intrante; apertura alba, lunari ovata; operculum corneum.

Hab. West coast of Africa.

Marginella (Glabella) Davisiana, n. s.

M. testa M. bellii Sow. simili sed multo minore, crassiore, angustiore et pallidiori, lineis longitudinalibus distantibus: labro intus crenulato, extus valde incrassato, columella quadriplicata.

Hab. West Africa. Captain Davis. (Coll. Keen.)

Marginella (Gibberula) nana, n. s.

M. testa obtuse conica, flavescente alba, nitente, lineis rubris tribus cincta; spira parva; columella valde callosa, quinque vel sexpli-cata; labro incrassato, intus crenulato, superne et inferne unimaculato. 3 lines by 2.

Hab. ? (Coll. Higgins, Keen and Marrat.)

Marginella (Gibberula) lucida, n. s.

M. testa cylindraceo-oblonga, semi-pellucida, nitente, lutescente alba obscure unifasciata, levigata, spira immersa, columella quadriplicata, labro flexuosa, tonui, incurva. 9 lines by 4.

Hab. ? (Coll. Keen.)

HABITAT AND HABITS OF *HELIX REVELATA*.

By RICHARD RIMMER.

In Guernsey the range of *Helix revelata* seems to be confined to the southern end of the island, where it occurs in considerable abundance, but a stranger ignorant of the precise nature of its favourite haunts would experience as I did, much difficulty in finding it. Armed though I was, with a chart supposed to indicate with accuracy the places of its abode, I searched in vain for many days and at last leaving in despair the spots which seemed most likely, I found it in quite a different locality.

On the crest of the grassy slopes which clothe with richest green the rugged cliffs down to their very edge, there runs along the southern end of the island a rude stone wall, and my experience with regard to *revelata* is that it is to be found at distances varying from five to fifty yards below this wall—most frequently, and certainly in greatest abundance among what might be termed mimic landslips of disintegrated rock. A small species of Sorrel, *Rumex acetosella* I think, grows among these loose stones, and a colony of *revelata* is pretty sure to be there also.

I particularly remarked the absence, as a rule, from among these colonies, of those commoner species such as *H. hispida*, *Z. albus*, &c. which are abundant all around; it may be that our little friend is pugnacious, and somewhat selfish.

I cannot help thinking that its favourite food consists of the eaves and roots of the species of sorrel above named, at all events I fed it for several days upon that plant, which it devoured with apparent relish.

REVIEW OF THE GENUS *TULOTOMA*, WITH
REMARKS ON THE GEOGRAPHICAL DISTRIBUTION
OF THE NORTH AMERICAN *VIVIPARIDÆ*.

By A. G. WETHERBY,

Assistant Professor of Natural History in The Cincinnati University.

In the old Lamarkian genus *Paludina*, several groups of fresh-water mollusca were placed, which have since been separated. Although these groups agree in being ovo-viviparous, and have some anatomical characteristics in common, the separation of the shells included by Lamark under *Paludina*, into the genera *Vivipara*, *Melanthro*, *Lioplax*, and *Tulotoma*, is now very generally recognized among American Naturalists, and has very greatly aided in the classification of the abundant representatives of the *Viviparidæ* to be found in the various parts of the United States.

The special object of the writer is, as briefly as possible, to review the genus *Tulotoma*, as hitherto understood, and to add some facts, recently established, to our knowledge of the shells. These facts rest upon a protracted study and comparison of many hundred specimens, from the largest adults to those just removed from the ovaries; and taken at different localities on the Coosa, and Alabama rivers, the localities being many miles apart, and in different geological formations. As the specimens were obtained by a collector, I have not had the very great advantage of studying the living animals in their native habitat; a pleasure that I hope the coming summer may afford. But I offer the following review, in the belief that it will be found in the main correct, and with the hope that others interested in these mollusks may perfect the work here begun.

The first species published, of the genus under consideration, was the *T. magnifica*, Conrad, or *T. bimorilifera*, Lea. Mr. Con-

rad's description was published in N. Fr. W. Shells, 1834, p. 48, Pl. viii, fig. 4. Mr. Lea's description was published in Trans. Am. Phil. Soc., Vol. 58, Pl. xix, fig. 71, date of title, 1837. Without entering into discussion of the matter here, it may suffice to say that Mr. W. G. Binney in his elaborate review of the *Viviparidae*, in "Land and Fresh Water Shells of the U.S.", published by the Smithsonian Institution, gives the species to Mr Conrad, while Dr James Lewis, who is always very critically correct in such cases, gives the species to Mr. Lea. I have not had the evidence necessary to definitely settle the question of priority, which ought to be honestly put right.

By both writers the species in question was described as a *Paludina*; Mr. Conrad giving as habitat, "Alabama River at Claiborne," and Mr. Lea simply "Alabama River." It is proper to add that Mr. Conrad collected his own specimens, while Mr. Lea received his from Judge Tait. In Trans. Am. Phil. Socy., ix, 22, (1844), Mr. Lea described the *Paludina angulata*, from the "Alabama River (Judge Tait)." As his types of both species were from Judge Tait, it is to be inferred that the type of *P. angulata* was from a locality not remote from that which furnished the *P. limoniifera*. In the same volume of the Transactions, ix, p. 23, (1844), he described the *P. Coosaensis*, from the "Coosa River, Alabama, Dr. Brumby." It will thus be seen that all the types were from different parts of the same stream; that all were described as *Paludina*, and that two of them were published in 1844.

Previous to the description of the last two species, in July, 1840, Prof. S. S. Haldeman commenced the publication of his "Monograph of the Fresh Water Univalve Mollusca of the United States," which, as Mr. Binney observes, "must always remain a standard work on the genera of which it treats." In a supplement to pt. 1 of this Monograph, October, 1840, Prof. Haldeman published five sub-genera of the *Paludina*, as follows; *Paludina*, Lam.; *Lutella*,

Hald.; *Nematoma*, Benson; *Amnicola*, Gould and Haldeman; and *Tulofoma*, Hald.; the latter being described as follows: "Soft parts of animal and lingual dentition unknown. Operculum with the nucleus simple. Shell thick, pointed conic, imperforate. Whorls flattened, nodulous, carinated, with a dark, olivaceous epidermis; peristome thin, continuous."

The generic description here given is somewhat faulty, as the term "pointed-conic" does not apply to the shells in question, all the species being obtusely-conic, even when the spire is most perfect. The epidermis, in all the species, ranges through all varieties of coloration, yellow, green, red and purple tints to black, and the shells are often beautifully banded. The shells of the *T. Coosaensis*, are not "imperforate," the peristome is not reflected as in the other species: nevertheless they are but slightly umbilicate. The shells of both *T. angulata* and *T. Coosaensis* may be described as *thin shells* with entire propriety: and the latter is very thin for a species of this family. The description of the operculum is altogether faulty, or rather wanting, and, in shells where that organ is so entirely different from that of associate genera of the same family, the difference is worthy of particular notice, especially since, in the species under consideration, it is precisely alike.

Mr. Binney, probably recognizing these facts, says, "Operculum horny, subtriangular, with a lateral nucleus and concentric striae." This description would read more correctly if semicircular was substituted for "subtriangular", and the following added: Columellar margin straight, outwardly reflected, forming an elevated, marginal fold, along its whole extent. Nucleus central on the columellar margin. Operculum increasing by growth in semicircular layers, which overlap each other, so that the outer margin is much the thinnest part. Outer surface rough and scaly; inner bearing a lunatic cicatrix of attachment, and a narrow, polished line surrounding it.

By comparing the opercula of various *Viviparidae* in my collection, I find that of *Tulotoma* to be most nearly allied to that of *Zygaster*, both in form and manner of growth. The reflected edge, however, is distinctive, as is the fact that the opercula are always bent, laterally, so that the extremities curve upward when the operculum rests upon the outer surface. This prominence has been given to the description of the operculum, because of its high office as a protective organ, and the fact that it is almost identical in the three species of *Tulotoma*.

It will be remembered that Prof. Halleman's description of the genus begins with the words, "Soft parts of the animal and lingual dentition unknown." These were described by Mr. W. G. Binney in Annals of the Lyceum of Natural History, Vol. ix., February 1870, as follows. "Foot moderate; not produced beyond the snout. Color dark blue. Head and snout small. Right tentacle broad. Left cervical rappet small; right larger, trough-shaped. Branchial laminae mucronous, long, narrow, crowded in a double row. Lingual membrane long, with the arrangement of teeth usual to the family. Teeth 3 . 1 . 3. The centrals are subcircular, with a truncated, irregularly horizontal base; the apex recurved, channeled and obtusely knobbed or denticulated. The first lateral is about as wide as the central, swelling, bulging at the sides, truncated and horizontal at the base, its apex deeply digitated or fringed; some of the denticles being recurved at their apices. The second lateral is laminar, narrowing slightly towards the truncated base, curving outward from the central tooth, its apex with long fringe-like denticles, some of which are recurved, others obtusely knobby. The third lateral resembles in shape and size the second, but is somewhat less curved, and has shorter, less delicate denticles. There is considerable variation in the number, length, delicacy and arrangement of the denticles on the different teeth. In some cases they are very broad, with simple, recurved edges. In others they are long, narrow and bifurcate. Again on many teeth the denticles

are not absolutely separated, one from the other, but the end of the tooth is rather deeply channeled. The variations occur in the laterals, the centrals being more uniform. The side edge of the laterals is sometimes recurved for a considerable length."

From this description of the animal, we can readily perceive its analogies with other genera of this family, and I may add, that I have taken as many as seven or eight young shells, with from rather less than one whorl to more than two, from the ovaries of a single individual.

The history of the descriptions being given, and the generic alliances proven, it remains to consider the validity of the three species written. Prof. Haldeman united all three species under *T. magnifica*, Conrad. In his review of this genus, published in the Smithsonian work to which allusion has already been made Mr. Binney agrees with Prof. Haldeman in uniting *T. magnifica* and *T. angulata*, but says with reference to *T. Coosaensis*, "Mr. Lea's type of this species bears but little resemblance to *T. magnifica*, yet Prof. Haldeman unites the two. I myself have seen no connecting links between them, though I have examined numerous young individuals of *T. magnifica*." In this latter decision Mr. Binney was entirely correct, and the only wonder is how any person, having seen the shells, could have decided otherwise. But in reference to uniting the *T. magnifica* and the *T. angulata*, there is by no means an equal degree of certainty. It must be borne in mind, that the geographical distribution of shells is an important factor in determining their specific relations; and in no case is this fact more fully demonstrated, than in the study of the fresh-water operculæ of North America. The *Talotoma angulata* has not been found in that part of the Alabama river which furnishes the typical specimens of *T. magnifica*; at least such has been the result of all my endeavours, and collections containing many hundreds of specimens, of all ages and sizes, have reached me from all parts

of the river between Wetumpka and above that place to Claiborne, the locality of Mr. Conrad's types. Whether this indicates that the *T. angulata* varies in its down-stream distribution, until it reaches the enormous development of the typical *T. magnifica* is a problem that I have not the proper means of determining, but while there are intermediate forms, *they are in no case adult*, so far as my observation extends, and as the shells are separated by better and more constant characters than are often regarded as being of specific value, I have deemed it proper for the present, to treat them as different species.

They are separated by the following remarkably distinct and constant characters: *T. magnifica* is a very massive and heavy shell, attaining dimensions of 50 millimetres. *T. angulata* is comparatively light and thin, and seldom exceeds 30 mill. The whorls of *T. magnifica* are heavily waved, and ornamented with double rows of tubercles, while the sutural angle is abrupt, leaving the top of the whorls squarely shouldered. Those of *T. angulata* are smooth, or very slightly nodulous, with a long, sloping angle to the suture, about which there is a very small shoulder. The aperture of *T. magnifica* is proportionally much smaller than that of *T. angulata*, and the row of tubercles produces abrupt, angular indentations of the lip; while that of *T. angulata* is more regularly curved. These differences are apparent at the slightest glance, and do not seem to be the result of differences of habitat, as the transitional forms do not occur between the localities furnishing the typical specimens of the species: at least they do not occur *as adult*.

The *T. Coosaensis* is so very distinct from the other forms, as to almost warrant its generic separation. The aperture is nearly circular, like that of *Vivipara*: the shell small, perforate, and comparatively thin: the sutures are deeper: the whorls convex at base and sides, but distinctly and widely planiform above. Yet the

most remarkable feature of this species, is its coating of long spines or hairs, arranged in spiral rows around the whorls, forming the most anomalous and interesting species in the whole range of our freshwater mollusca. That Mr. Lea's type specimen was an old shell, without an operculum, and from which the spines were eroded, is probably true, as, having already published two species, he would have noticed the very distinct operele, and the hairy spines of the epidermis form a feature, that no naturalist of Mr. Lea's unusual acuteness, would have passed without observation; yet we find no mention made of the very remarkable operculum in any of the species, nor of the hirsute epidermis of *T. Coosaensis*. To obtain fine specimens of the latter species, has been very difficult, as the older adults seem to lose the spines by erosion; though if taken in the early autumn, the summer's growth of shell is generally clothed with its proper appendage. All the genus inhabit the Coosa, the *T. angu'ata* and *T. Coosaensis* being confined, so far as I have been able to discover, to the upper and more rapid parts of the stream; while the *T. magnifica* occurs in the lower parts of the Coosa and in the Alabama proper. I do not deem it by any means improbable that this anomalous system of drainage, containing two genera of operculates not found elsewhere in the world, may yet furnish extraordinary riches of knowledge bearing upon the great problem of Geographical Distribution; a problem which I firmly believe will reduce twenty-five per cent of all known species to synonyms. While separating the *T. angu'ata* for the present, from the *T. magnifica*, the very fact of their residing in parts of the stream so different, may offer suggestions as to their identity: and the question is not so much whether the same species can exist under such varying conditions, as whether the varying conditions do not produce varieties that have been called species. The shells live on the under side of loosely lying rocks and large stones, to which they cling with much tenacity. They are very abundant,

and all the varieties of coloration are well represented by specimens. To these remarks it should be added that *T. Coosaensis* has so far proven much more difficult to obtain than the other species. Along with them are found the species of *Schizostoma*, and those varying forms of *Goniobasis Anculosa* and *Lithasia* which have given rise to a multitude of doubtful species.

A few words in regard to the Geographical distribution of the North American *Viviparidae* seems to be in place here, in contrast to the extremely limited range of the species in question. The genus *Melanstro* is found from Canada to the lower part of the Gulf drainage, having its most ponderous forms and greatest diversity in the central district of this range. The genus *Zioplax* extends from New Jersey and Pennsylvania southward to the Gulf drainage, having its most abnormal species in the Coosa river, associated with *Tulotma* and *Melanstro*. *Vivipara* extends from Minnesota to Mexico, and has its most highly developed forms in the same region as *Melanstro*, or, perhaps, more properly in its western half. These shells are widely varied in different habitats, as to their size and weight, but they never seem to lose their distinctive characters, with the single exception of *Melanstro*; and greater interest is added to this fact, as we find specimens, identical in every respect, inhabiting the extreme limits of distribution. I have recently obtained *V. intertexta* from Lakes in Minnesota, identical with specimen received from Louisiana at the same time. Likewise, the northern specimens of *Vivipara contectoides* are identical, in every particular, with those from Florida.

In this same range the variation of the *Streptomatidae* is so great that there are no common species; the few northern forms of this family entirely disappearing within the limits embraced by the Ohio system of drainage. Though *Limnaea* and *Physa* are sub-boreal genera, a few obscure species have a range far to the south, being found in Texas and the other gulf states. But whether they are

varieties of northern forms is yet an open question. Very few, if any, of the *Naiädes* have an equal distribution; and the same is true of our Land Shells. In these facts are the data for much profitable study, earnest field work and anatomical examination. And when we find a stream, from whose pregnant waters one hundred and eighty-two described species have been taken, and when we reflect that two genera of these shells are confined to its limits, the problem assumes proportions of interest not exceeded by that of any other stream in the world. Besides, its rocky banks, of Tertiary and Cretaceous sands and clays, crowded from base to summit with remains of ancient life, render this region classic ground to the student of Palaeontology; and if the facts and suggestions contained in this article, tend in any way to the fuller understanding of the anomalous fauna of this region, the object of the writer will have been fully attained.

Zonites glaber, (Sowerby), near Leeds.—While collecting shells on the 24th of September, 1876, in company with my friend Nelson, at the village of Shadwell, I took a specimen of this species, this brings its occurrence nearer Leeds than hitherto recorded.—
H. CROWTHER.

Anealus flavatilis var. **gibbaa**, (Bourguignat).—I have to record two new Yorkshire localities for this variety, one is a small stream that runs into Lake Semmerwater in Raydale; the other a small ammonite stream near Goosnargh, in Swaledale. In both the above places, I took it about two years ago.—
H. CROWTHER.

NOTE ON *LIMNÆA STAGNALIS*.

By WILLIAM NELSON.

This species has the power (occasionally at any rate), when irritated, of discharging a pale violet coloured liquid. Having observed many times, that in scalding the animal of this species, previous to cleaning out the shells, that the water was tinged with violet, I was led to pay particular attention to them in the living state; and found that they discharged this coloured liquid sometimes at once upon being lifted out of the pond, but more often if irritated.

Helix hispida var. *albida*.—This variety has occurred somewhat commonly during the present spring, several specimens having been reported from Wakefield, Sandal, Scarcroft, Roundhay, Whinmoor and other places.—JNO. W. TAYLOR.

Clausilia biplicata var. *Nelsoni*.—In March, 1866, while collecting this species on the bank of the Thames, at Hammersmith, from the trunks of the willow trees, near its margin, I found a variety, which on being submitted to Dr. Jeffreys some time afterwards he named as above at my request, after my colleague Mr. Wm. Nelson.

It is rather more slender than the usual form, almost totally devoid of striation, and translucent, the axis being visible through the shell; the last whorls are tinged with a very pale reddish brown, passing into whitish on the upper whorls.—JNO. W. TAYLOR.

Clausilia biplicata var. *albida*.—I may record here that in September, 1876, while at Heidelberg in Germany, I found a beautifully pure white and fine specimen among the herbage in the vicinity of the castle.—JNO. W. TAYLOR.

Helix Dehnei, Rossm.—I have recently found specimens of this species in my collection of *Helicidae*, where the specimens were unidentified until recently. I received them a few years ago with some other interesting species, procured from gum imported from N. Africa.

Until recently, only one specimen was known of this species, which was obtained by the same means as the specimens in my possession.

It is allied to *Helix subdentata*, Fér.; and also to *Helix pisana* approaching most nearly to the African form of that species.—Jno. W. Taylor.

Argiope cistellula at Weymouth.—I have lately found on this coast, specimens of the above species, thus confirming its southern range.—R. DAMON.

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Catalogue of the Genus *Pleurotoma*. By H. C. Weinkauff, pp. 1—10.

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Critical review of the Genus *Deridae*. By Dr. R. Bergh, 45—47. Remarks on some Transcaucasian species of Pupa. By Dr. O. Reinhardt, pp. 76—86.

Three new species are described *P. interrupta* (Pl. iii, fig. 4); *P. clavella* (Pl. iii, fig. 6); and *P. (Isthmia) Saturnensis* (Pl. iii, fig. 7).



ON THE VITALITY OF CERTAIN LAND MOLLUSKS.

By ROBT. E. C. STEARNS.

From the Proceedings of the California Academy of Sciences, Oct. 18th, 1875.

I submit for the inspection of the Academy a living specimen of *Bulimus pallidior*, Sby., one of nine given to me by Prof Geo. Davidson, who collected them at San José del Cabo, Lower California, in March, 1873.

These snails were kept in a box undisturbed until June 23, 1875, when I took them out, and, after examination, placed them in a glass jar with some chick-weed and other tender vegetable food, and a small quantity of tepid water, so as to make a warm humid atmosphere. This hospitable treatment induced them to wake up and move about after their long fast and sleep of *two years, two months and sixteen days*. Subsequently all died but this, which seems to be in pretty good health, but not very active.

It may be remembered that I mentioned before the Academy at a meeting in March, 1867, an instance of vitality in a snail (*Helix Veatchii*), from Cerros Island, even more remarkable, the latter having lived from 1859, the year it was collected, to March, 1865, a period of *six years*.

The famous specimen in the British Museum which is cited in the books, *Helix desertorum*, had lived within a few days of four years, fastened to a tablet in one of the cases, when discovered to be alive.

Helix desertorum, as the specific name implies, is found in arid and sterile areas, in the continents of Africa and Asia, and has, as will be perceived, a wide distribution. From the former continent, I have specimens from Egypt, and it also ranges through Arabia in the latter.

The *Bulimus* from the mainland of the peninsula of Lower California, and *Helix Veatchii* from Cerros or Cedros Island, off

the coast on the ocean side of the same, come from within the same physical environment, being comparatively a limited distance apart.

The *Helix* belongs to an interesting and peculiar group, probably varieties of one species, which includes, at present, the following names: *Helix areolata*, Sby., *H. Veitchii*, Newc., *H. pandora*, Fbs., and *H. levis*, Pfr. Other forms geographically approximate may hereafter, on further investigation, be referred to the same lineage.

Of the above, *H. areolata* was the first described, or I should say that this appears by the date to be the first name bestowed upon any member of the group. This species has been quoted from Oregon, and *H. levis*, from the Columbia River, in both cases erroneously. The figures in "Land and Freshwater Shells of North America," p. 177, are too elevated and globose for the typical *areolata*, but the larger figures faithfully represent *H. Veitchii*. Elevation and rotundity are insular characteristics in this group, and *areolata* is comparatively depressed. It is found in considerable numbers on the uplands around Magdalena Bay, which is on the outer or ocean shore of the peninsula, in latitude about 24° 40' N.

Bulimus pallidior, which is pretty generally distributed through Lower California, from Cape St. Lucas northerly, has also erroneously been credited to San Diego in California proper. It is arboreal in its habits, at least during the winter season, and frequents the Copaiwa trees. It has been said to inhabit South America, which is probably incorrect, and the locality "San Juan," mentioned in "L. and F. W. Shells," on p. 195, where a good figure of this species may be seen, should be *San Juanico*, which is on the east side of the peninsula, in latitude about 27° N.

The great importance of particularity in habitat will be at once perceived, when I state, that there are no less than three other localities on the west coast of America, north of the place cited, all of which are referred to in various scientific works, which have

come under my observation, as "San Juan," and there are perhaps as many more "San Juan's" south of that specially quoted herein on the westerly coast of America, in the Central and South American States.

Attention is directed to the fact that the three species herein mentioned as exhibiting extraordinary vitality, belong to geographical areas, which receive only minimum rainfall, or which are, in simple language, nearly rainless regions.

Within such areas, vegetation is extremely limited even in favourable seasons, and the presence and growth of the annual plants is, of course, dependent on the rainfall; this last occurring infrequently makes the food supply of land mollusks and other phytophagous or vegetable-eating animals exceedingly precarious.

It is highly probable that a careful investigation in this direction will lead us to the conclusion, that the land mollusks which inhabit arid areas have, through selection, adaptation and evolution, become especially fitted for the contingencies of their habitat, and possess a greater degree of vitality or ability to live without food than related forms in what may be considered more favorable regions, and through and by reason of their long sleep or hibernation, *more properly estivation*, with its inactivity and consequent immunity from any waste or exhaustion of vital strength, are enabled to maintain their hold upon life when animals more highly organised would inevitably perish; and we are furnished with an illustration, in the instances cited, how nature works compensatively, when we institute a comparison with the opposite condition of activity, and the food required to sustain it.

American Naturalist, Jany., 1877.

YATES, LORENZO G.—Notes on the aboriginal money of California.—pp. 30—32.

The *Dentalium* is used by the Indians of the North. Large quantities of which have been imported from Europe for trade with the Indians.

The shell of *Saxidomus aratus* is broken and fashioned into circular disks of suitable size, a hole drilled through the centre, and then strung on strings. Eighty of these disks are valued at one Dollar by the Indians of Lake County.

The shell of "Abelone" (*Haliotis*) is formed into a somewhat pentagonal form, and also into circular disks, plain or ornamented, these appear to be also used for personal adornment, &c.

Olivella biplicata, Sowby., is also (or was) used for money, the top of the spire being rubbed off to allow of a string being passed through, or sometimes pieces of the larger whorls were broken off, and perforated for the passage of string.

February, 1877.

STEARNS, ROBT. E. C.—On the vitality of certain Land Mollusks.—pp. 100—102.

March, 1877.

POURTALES, L. F.—Hints on the origin of the Flora and Fauna of the Florida Keys.—pp. 137—144.

These islets have received their flora chiefly from the West Indies, and the fauna mainly from the North American Continent.

The Land Shells, according to Mr. Binney, are quite the same as South Florida, and seem to be about equally derived from the great "Southern Province" of the Eastern region of North America and from the West Indies.

The species derived from the West Indies are

<i>Zonites Gundlachi,</i>	<i>Strophia incana,</i>
<i>Patula vortex,</i>	<i>Stenogyra gracillima,</i>
<i>Helix varians,</i>	<i>Liguus fasciatus,</i>
<i>Cylindrella Poeyana,</i>	<i>Orthalicus undatus,</i>
" <i>jejuna,</i>	<i>Chondropoma dentatum.</i>
<i>Macroceramus ponticus,</i>	

Species derived from the "Southern region" of North America:

<i>Glandina truncata,</i>	<i>Pupa variolosa,</i>
<i>Succinea campestris,</i>	" <i>modica.</i>
<i>Polygyra Carpenteriana,</i>	" <i>ruplicola,</i>
" <i>septemvolva,</i>	<i>Helix pulchella,</i>
" <i>cereolus,</i>	<i>Zonites minusculus,</i>
" <i>uvulifera,</i>	<i>Helicina orbiculata.</i>

Descriptions of Six New Species of Shells from the collections of the Marchioness Paulucci and Dr. Prevost.—By G. B. Sowerby, Junr., F.L.S.

(From P.Z.S., November, 1876, pp. 752—755).

Conus Paulucciæ, (fig. 3), Mauritius. An addition to the subgenus *Cylinder*, resembling in form *C. gloria-maris*; and in color and markings *C. aureus*.

Conus superscriptus, (fig. 4), Madagascar. Quite a distinct species, and remarkable for its bluish tinge of color and delicate letter-like markings.

Conus baccatus, (fig. 5). This species is of a somewhat stunted form, and is furnished with a double angle at the top of the body-whorls, the markings are very delicate, and there are rows of gem-like granules round the whorls.

Conus reflectus, (fig. 6). A pyriform species of a whitish color, with two broad rose-colored bands, clouded with brown.

Lima Zealandica, (fig. 1a, 1b), New Zealand. Distinguished by a broad concave lunule, forming a straight outline to one side of the shell, terminating in an abrupt angle.

Its nearest allies are *L. paucicostata*, Sow. from the Red Sea and *L. multicostata*, Sow., from Australia. A New Zealand pliocene fossil comes still nearer. All hitherto known species (except *L. fasciata*) are entirely white; a variety of this species has the ribs of a reddish brown.

Cardium ornatum, (fig. 2), Hong Kong. A small species with conspicuously noduled ribs, and ornamented with distant red spots.

THE 'VALOROUS' EXPEDITION.

Reports by

DR. GWYN JEFFREYS, F.R.S., AND DR. CARPENTER, C.B., F.R.S.

[From the Proceedings of the Royal Society, vol xxv, No. 173.]

This report is marked with the usual care and labour, which the learned author, invariably bestows upon his work.

The part taken up with the Mollusca fills 25 pages, and is divided into a narrative and tabular account of the results; the former of which contains a history of the Scientific exploration of the deep sea in the North Atlantic and Arctic Seas.

There is an interesting account of the synonymy of *Littorina rufa*. The only land shell obtained at Godhavn was *Vitrina pellucida* from among moss, at the sides of small streams formed by the melting ice.

In paragraph 10, is the only allusion that is made; and that, in the most brief manner possible, to the imminent peril in which not only the scientific results of the expedition was placed, but also the lives of the explorers, when the ship stranded on a sunken reef of rocks, about ten miles from Holsteinberg, which had not been laid down on the chart. Whilst the ship was undergoing repairs,

they had some boat dredging in shallow water, where among other Mollusca was a living specimen of a new species of *Pleurotoma*, unlike any European or North American species; which is described as *P. rubescens*, Jeff.

The number of marine species procured during the expedition was 181; viz: 122 in Davis Strait, and 59 in the North Atlantic, besides fragments of several undescribed species. Altogether there are no fewer than 57 new species: (*Brachiopoda* 2, *Conchifera* 16, *Solenaconchia* 7, *Gastropoda* 11, *Pteropoda* 1, *Cephalopoda* 5), all except the *Pleurotoma* from great depths.

The author discusses the question of the mollusca of Davis Strait being American or European, and gives his reasons for inclining to the latter opinion.

Twelve new species are enumerated:—*Atretia gnomon*, *Pecten fragilis*, *Lima gibba*, *Nucula reticulata*, *N. expansa*, *Glemus nitens*, *Malletia cuneata*, *Kellia symmetros*, *Axinus incrassatus*, *Dentalium candidum*, *Pleurotoma rubescens*, *Utriculus substriatus*.

Three new genera are characterized, viz.—

Atretia, Jeffreys.

A remarkable brachiopod. 'Its nearest ally is *Rhynconella* from which it appears to differ only by a straight instead of an incurved beak.'

Glomus, Jeffreys.

'Has the aspect of *Plicunculus* and the hinge of *Leda*; but the teeth are not arranged as in either of those genera.'

Seguenzia, Jeffreys.

'This genus evidently belongs to the *Solarium* family, but is distinguished by having a broad and deep open furrow (rather than a cleft) in the upper part of the last whorl.'

The Report should be in the hands of all who are interested in marine invertebrata, as it is full of invaluable and deeply interesting matter.

Since the publication of the Report, the whole of the new species have been described, and will be noticed in our next issue.

Journal de Conchyliologie, January, 1877.

CROSSE, H.—Faune malacologique des îles Kerguelen (Malacological Fauna of the Kerguelen Islands) pp. 5—15.

The naturalists attached to the English and American Transit of Venus Expeditions made collections at these islands, the mollusca of which have been described by Messrs. Smith and Dall. No land shells have been added to the species already known—*Helix Hookeri*, Reeve,—but 25 marine species are enumerated of which a large proportion are new. The name *Eatenia* given by Mr. Smith to a new genus of *Rissoide* having been already used by Hall for a genus of *Brachiopoda*, Mr. Dall has proposed to alter it to *Eatoniella*. Mr. Crosse remarks that the fauna of the Kerguelens whilst closely related to that of New Zealand, is not without affinity to that of the Straits of Magellan, and has also special peculiarities.

DUPUY—Note sur quelques Mollusques trouvés à Barbotan (Gers) (Note on some Mollusca found at Barbotan in the Department of the Gers) pp. 15—23.

The Abbé Dupuy and M. Dubalen had special opportunities for examining the fauna of this thermal station, having been staying there when the large hot water tank was emptied. In this tank, supplied by three hot springs which kept the water at a temperature of 30°—35° Cent. = 86°—95° Fahr., freshwater mussels, especially magnificent specimens of *Unio Requienii*, Mich., were found in abundance, and without the erosion which so commonly injures the beauty of fresh water shells. *Lymnaea* and *Physæ* were also found in water of the same temperature in other parts of the bathing establishment. At the foot of the walls of the church,

* *Pupa dilucida*, Ziegl., a species new to France, occurred. It was previously known from the Tyrolese and Lombard Alps. 67 species of mollusca from the neighbourhood of Barbotan are catalogued.

MONTEROSATO.—Note sur quelques coquilles provenant des côtes d' Algérie (Note on some shells from the Algerian Coast), pp. 24—49.

The receipt of a collection of shells made by M. Joly in Algiers Roads has enabled the Marchese di Monterosato to add a considerable number of species to those enumerated by Weinkauff in his Catalogues of Algerian Shells (Journ. de Conch., 1862 and 1866), and in the present article, without giving a complete list, he mentions 148 species which are new to the locality or respecting which he has some remarks to make. *Tapes pullistria* (*vera*) occurs. *Chiton Polii*, is abundant in the Mediterranean, but Algiers is one of the few localities where uneroded and unencrusted specimens occur. The operculum of *Fossarus* is described, and only two true Mediterranean species are admitted. *Mitra fusca*, Swainson, a fine species, 40–45 mill. long is mentioned. The following species are figured, of the new ones general indications of the characters are given. *Defranceia concinna*, Scacchi, (Pl. ii, fig. 1.) *P. linearis*, Montagu, (fig. 2.) *Marginella atlata*, Monterosato, (fig. 3.) *Ringicula conformis*, Monter., (fig. 4.) *Scalaria candidissima*, Monter., (fig. 5.) *Trochus Drepensis*, (fig. 6.) *Odostomia internodula*, S. Wood, (Pl. iii, fig. 1.) *Eulima intermedia*, Cantraine, (fig. 2.) *Rissoa Weinkauffi*, Schwartz, (fig. 4.) *R. Algeriana*, Monter., (fig. 5.) *R. sculptilis*, Monter., (fig. 6.) *R. aurita*, Monter., (fig. 7.) *R. seminulum*, Monter., (fig. 8.) *R. laevis*, Monter., (fig. 9.) *Vermetus cristatus*, Biondi, (fig. 10.)

M. Crosse remarks in a note on the use of the name *Scalaria*

Turtonis, Turton, by the author. With two of M. Crosse's objections we quite agree. No one should give his own name to a species, even under the pretext that it is so called in compliment to a member of his family, or to a namesake, and the shell, if named after Mrs. Turton, should have been *Turtonæ*, but we differ from him as to the use of the third declension. If a French Conchologist had the good fortune to bear the name of Cicéron, or the ill-luck to be named Néron, would M. Crone in dedicating a shell to him call it *Ciceroni* or *Neroni*? Such a solecism would be enough to make the former of those men rise from his grave. In our opinion too great severity should not be exercised on this point of latinizing names, as we know that the Romans by no means always latinized "barbarous" names by merely tacking an "us," or an "a" to the end of them. The original of *Caractacus* for instance, was not *Caractac* but *Caradoc*, and we may be pretty certain that Boadicea's Celtic designation differed a good deal from "Boadice."

FISCHER, Dr. P.—Faune malacologique de la vallée de Cauterets,—additions et corrections (Malacological fauna of the Valley of Cauterets—additions and corrections), pp. 49—56.

A supplement to the article at pp. 51, &c seq., of the last volume. The slug there called *Amalia marginata*, Dup., is now described as a new species, *Limax altilis*, Fischer, a curious hairy variety of *H. Moulinsi*, Farines, is described (var. *acrotricha*, Fisch.) and the occurrence of *Hydrobia Reynieri*, Dup., var. *canaliculata* in a stream at a altitude of 1350 mètres is noted.

FISCHER, Dr. P.—Note sur le *Capulus Shreevei*, Conrad, (Note on *C. Shreevei*), pp. 57.

This supposed *Capulus*, from South Carolina, turns out to be an ossicle of *Pholas*.

BAUDON.—*Monographie des Succinées françaises* (*Monograph of the French Succinæ*) pp. 57—69.

In this first part of his monograph Dr. Baudon gives some general observations on the genus, its history, characters, the habits of the mollusks, the geographical distribution of the French species, &c. He speaks of their great power of enduring cold, some specimens of *S. putris* having suffered no injury from an imprisonment of several months in a flask lined inside with ice. He then gives a list of the species, 10 in number, respecting which we would remark that *Suc. Pfeiferi* and *elegans* are usually considered synonymous, that *S. parvula* does not appear in Kobelt's Catalogue, (possibly it is a new species, but as no author's names are added to any of the species it is difficult to say). *S. Baudoni* is, according to Moquin-Tandon, a var. of *S. arenaria* and a "species dubia" of Kobelt. *S. acrambleia* is not in Kobelt, we suspect it is one of Bourguignat's species. *S. debilis* is placed by Kobelt among the "species dubiae," but is probably good, and *S. humilis* is, according to Moquin-Tandon, as well as to Kobelt, only a var. of *S. oblonga*. This would reduce the number of species nearly to Moquin-Tandon's original 5. *S. debilis* being, we very much suspect, the only real addition, but the continuation of the article must be awaited before pronouncing a final opinion. We must, however, confess to very Herodian proclivities as to European species especially, and we highly approve of the massacre of the innocents which has been going on at the hands of Dr. Kobelt for the last few years.

CROSSE and FISCHER.—Note sur le nouveau genre *Acroptychia* de Madagascar—(Note on the genus *Acroptychia* from Madagascar), p. 70.

In consequence of the name *Eurychia* given by M.M. Crosse

and Fischer to a beautiful new genus of Cyclostomidae from Madagascar having been used in 1816 by Hübner for a genus of Lepidoptera, it has become necessary to find a new name for the molluscs. *Acroptychia* is therefore proposed.

CROSSE, H.—Note complémentaire sur l'*E. lima Stativa*, Iturina. (Supplementary note on *E. Stativa*), pp. 70—71.

This Dalmatian species was described in the 1869 Vol. of the Journal, (p. 242).—A figure is now given. (Pl. iii, fig. 3).

SOUVERBIE, Dr.—Descriptions d'espèces nouvelles de l'Archipel Calédonien (Descriptions of new species from the New Caledonian Archipelago), pp. 71—76.

Conus Lombarti, (Pl. i, fig. 1 and Pl. ii, fig. 7), a fine species nearly 4½ inch long of a deep orange colour, with white spots, Uvea; *Amathina angustata*, (Pl. i, fig. 6); *Mitra tururina*, (fig. 2.) Lifou; *Rissoina hystricula*, Art & Nou.; *R. scutapix*, (fig. 3), Art, Nou & Lifou.

SOUVERBIE.—Description d'un *Scalenostoma* nouveau, (Description of a new *Scalenostoma*) p. 77.

S. apiculatum from Mauritius.

CROSSE & FISCHER.—Diagnosis *Helicis novae insulae Madagascarie incolle*, (Diagnosis of a new Madagascar Helix) p. 78.

II. Suarezenis.

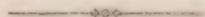
Palæontology, Bibliography and Obituary, (Dumortier, Liénard, Taslé, Rambur, Küster and Appelius), pp. 78—97.

NEWS.—(pp. 97—100).—The existence of an operculum in *Voluta musica* is confirmed, a new genus (*Volutolyria*) is therefore proposed for it. Another example of the venomous properties

of the Cones is given, *Conus marmoreus* being the species in question this time. (This fact has now been abundantly confirmed, there can be no further doubt on this point).

Three coloured plates, representing 22 species, accompany this interesting number of MM. Crosse & Fischer's Journal.

C. P. G.



VERTIGO MOULINSIANA, DUPUY.

[From the Annals of Natural History.]

This interesting and local little land shell has been lately discovered by Mr. Henry Groves, while botanizing, in a small marsh between Winchester and Southampton. See "British Conchology," I., p. 256, and v. (Suppl.) p. 106. Mr. Grove's specimens are rather more swollen or barrel-shaped than mine from the West of Ireland; and they agree exactly with some Danish specimens, for which I am indebted to the kindness of Dr. Mörch, as well as with the descriptions and figures of Dupuy and Moquin-Tandon. Küster and Kreglinger called it *V. Charpentieri*, after a MS. name given by Shuttleworth. Heyneman described it as *V. ventrosa*, and Westerland as *Pupa Lilljeborgi*. Dupuy's name (*Moulinsiana*) dates from 1849, and has priority.—J. GWYN JEFFREYS.



HELIX PISANA.—MÜLLER.

By G. SHERRIFF TYF.

While in Guernsey in the summer of 1876, I found this species

plentiful in Vazon Bay, on plants of *Brassica oleracea* (wild cabbage) and at the roots of (*Armeria maritima*) sea pink. A noticeable fact which I am unable to account for, is, that with rare exceptions, all the shells on the plants, and there were many thousands, were young of various ages having fragile additions to the mouth of their shell of the season's growth, while all the shells adhering to the walls of a small brick building near, were "finished," having the usual number of whorls and ribbed mouth. I examined a large number of plants in search of adult shells before I discovered the specimens attached to the walls of the hovel, after which I soon obtained as many as I desired.

I have not met with any record of *H. pisana* having been found in Guernsey before. My friend, Mr. Wm. Randall, the well known enthusiastic and kind hearted marine zoologist of Guernsey, mentioned a "banded shell of considerable size" which a friend of his had been pleased at finding near the Castle at S. Sampson's which I suspected was this species, but the only evidence I could find of its having existed there was one dead shell.

Its habitat at S. Clement's Bay, Jersey, is well known to most conchologists. I have had the pleasure of seeing it "at home" there. It lives within a few yards of the ordinary sea level, and I should imagine that at high tides the sea washes the "base of its habitation."

The largest shells here are much smaller than the largest Tenby specimens, and the prevailing colour of the banded shells is lighter. At Jersey (and Guernsey) the colour is umber of varying shades, at Tenby it is sepia of greater or less intensity.

In the Channel Isles I failed to find among many thousand shells, spread along a large extent of shore, an albino, or even a creamy-white opaque shell, the latter being common at Tenby,

and I believe often mistaken for the true variety *albida*, which is pure opaque white with translucent markings. The rose colour of the lip is not so intense in the Channel Island shells as the Welsh, although shells bearing this tint are less restricted at the former than at the latter place. Across "The Burrows" at Tenby there is a dry trench three or four yards wide, running at right angles with the present coast line, probably made when the sea was drained from this part of the land. Wm. Jenkins, the veteran collector of marine creatures at Tenby, told me I should not find many *Pisana* with a pink lip on the "other side" of this trench, (*i.e.* the farthest side from the town,) and I found his remark literally correct, only stray shells with this tinge occurring, and in all cases on the scrub near the line of shore sand, the great majority having a pale ochreous lip and rib. At Tenby there is a variety with red-brown markings, which invariably has a yellow lip, although yellow and pink are common, alike to sepia and creamy white varieties.

I have a few shells exceedingly dark, the hue being given by the coalescence of the bands or markings.

H. pisana has a wonderful capability of bearing great solar heat. It crawls up the stem of plants, and fixes itself with its shell naked and exposed to the full rays of a burning sun, and so remains all day, descending at "dewy eve" to enjoy a feast and a ramble. This is a habit peculiar to the more delicately constituted mollusks which have survived the struggle for existence, and succeeded in establishing themselves in our more northern clime, *e.g.* *H. Cartusiana*.

Why is it that this species is only found close to the sea in Great Britain? It does not seem to have any "likes and dislikes" in the way of food. I have not seen it more than half a mile from the shore, and the finest shells are always nearly, if not quite within reach of the sea spray when a strong wind blows.

In Spain it "is the common snail of the country," not being confined to the sea board. The Spanish habitat given to me with some of my shells is an inland one, and Dr. Gwyn Jeffreys gives "centre of France" as one of its habitats.

It varies somewhat in form in different localities. Shells which I have from Italy, Malta and North Africa being flatter spired, with less rounded whorls and sutures less marked than our own shells.

Besides the geographical localities named above I have shells from South France. A small form from Cannes given to me by Dr. Robert Battersby, which may be called *minor* being worth notice.

Its British habitats are those before named. St. Ives and Whit-sand Bay, Cornwall, and Dublin Bay. It occurs in marvellous abundance at Tenby, and is wide spread (southward) reaching to Manorbier, although in Montagu's time (beginning of this century) it was "confined to a small spot." It is in great profusion in both the Channel Island habitats the greater number being in Jersey.

II. pisana is said not to occur in France nearer to England than Brittany, but I suspect that it will be found somewhere along the coast line of that country nearer still.

May, 1877.

REMARKS ON THE GEOGRAPHICAL DISTRIBUTION OF THE MARINE *GASTROPODA* ON THE SOUTH AND EAST COASTS OF AFRICA.

By J. S. GIBBONS, M.B.

The part of the coast of Africa to be considered in this paper extends from the Equator to the Cape of Good Hope and belongs

to two very distinct regions—the Southern half composing the principal portion of the Cape Province, and the Tropical half belonging to the Indo-Pacific region, or if that is too extensive an area, to the subregion of East Africa and Madagascar.

The principal ports are Zanzibar in S. Lat. $6^{\circ}28'$, Mozambique some 500 miles to the south, and Inhambane on the Tropic of Capricorn separating the two provinces. The two next ports—Delagoa Bay and Port Natal—are both within 400 miles of the tropic, whilst Algoa Bay, Mossel Bay and Cape Town are situated towards the southern extremity of the Continent.

The physical conditions of the two regions are very dissimilar. In the one we have coral reefs, sloping sands and sheltered mud-flats, a smooth sea, warm water and a comparative absence of sea weed. In the other, steep exposed shores and primary rocks clothed with abundance of sea weed, and continually beaten by a stormy sea. Again, another difference is found in the tide, which at Cape Town and Algoa Bay is but trifling, whilst at Mozambique and Zanzibar the rise and fall is some 10 or 12 feet.

Port Natal in its physical conditions, no less than in its geographical position stands as it were, midway, between the two districts, shewing, however, in the general character of its mollusca a more decided alliance with the Cape than with the tropical East Coast.

A most important agent in influencing the distribution of the mollusca is to be found in the Mozambique current—a large body of water from the Indian Ocean, which strikes the East Coast at Cape Delgado, sweeps past Mozambique, Natal, &c., and finally passes round the Cape of Good Hope.

In regard to the mere number of species there is a similarity in the two regions. When on the Coast, I collected about 392 species of *Gastropoda*; of these 195 belong to the Cape region, 197 to the Coral seas.

When, however, the species and genera are considered there is a striking difference.

Of the entire 197 tropical species I did not find one at Cape Town and at Algoa Bay, but a few examples of one species (*Nerita albicilla*, L.)

This can only be explained on the supposition that the physical conditions of the latter places are incompatible with the welfare of tropical species, as otherwise the Mozambique Current would undoubtedly bring down numerous species. At Natal, where conditions are more favourable, out of 25 species collected 23 were also found in the Indian Ocean. It is interesting in nature that the Cape species proper, do not extend beyond the limits of the Province, less than half a dozen being found at Inhambane, immediately within the tropics.

As might be expected the relative preponderance of the carnivorous and phytophagous gastropoda of the two regions is reversed. Of 214 species of Siphonostomata, 46 are found to the south of the tropics and 128 within the tropics. Of 166 species of Holostomata, 103 are found in the South and 61 within the tropics. At Natal the numbers are about equally balanced, 43 Siphonostomata to 42 Holostomata. Certain genera are confined to each province, e.g. *Pteroceras*, *Terebra*, *Turbinella*, *Hipponyx*, *Daphnella* are characteristic of the tropical parts, as are also *Aura*, *Aplysia*, &c., whilst *Cominella*, *Haliotis*, *Calyptrea*, *Crepidula* and others are found only in the Cape region.

Again, certain genera are distinguished by possessing a greater number of species in one province than in another by being individually more abundant, or by the species being more typical.

In South Africa the genus *Fusita* (including sub-genera) furnishes some 30 species; at Mozambique only two are found, of which one extends down to Natal.

Bulla is represented at Zanzibar by one or two scarce species; at Natal and Algoa Bay there are 10 or 12 species and individuals are numerous.

The genus *Cyprea* furnishes more than 30 species on the tropical East Coast, and with few exceptions each species is individually numerous. Below Natal the species are few, principally belonging to subgenera, and individuals are rare. *Strombus* with 8 species at Zanzibar is represented at Natal by a solitary straggler, (*S. floridus*, Lam.) Typical species of *Nassa* prevail along the East Coast; to the South they are replaced by species belonging to the subgenera *Desmoulea*, *Cyclonassa*, &c.

Tissurella (with the subgenera) contains 15 or more S. African species. I found but one in E. Africa.

The *Trochi*, 30 in number, cover the rocks at Cape Town and Algoa Bay in vast numbers from high water mark downwards. At Zanzibar a few species are sparingly found, lurking under stones at low water only.

Ricinula and *Cerithium* are well developed genera in the tropics, fairly represented at Natal and all but absent at the Cape. *Planaxis*, *Olivella*, *Nerita*, *Parmophorus* and other genera do not extend below Natal. Some genera are pretty evenly divided, having a common meeting ground at Natal and Inhambane, e.g., *Littorina*, *Cassis*, &c. In walking over a coral reef at Zanzibar, the shells that strike the eye are *Strombus*, *Cyprea*, *Turbinella*, *Cerithium* and *Ricinula*, whilst between tide marks at Algoa Bay or Cape Town, one notices the great abundance of *Patella*, *Siphonaria*, *Trochus*, *Cominella* and *Bulla*. On such a large extent of coast there are necessarily considerable local differences between Zanzibar and Moambique, however, they are few or none. The molluscan fauna of Inhambane is peculiar, inasmuch as certain widely distributed tropical species are found there which are absent or scarce higher up the

coast, e.g., *Fusus' colus*, L. occurs in prodigious numbers at Inhambane, whilst at Zanzibar and Mozambique I failed to discover the slightest trace of a specimen. *Murex brevispinosa*, Lam. is still more numerous and with the last is burnt for lime, but at the other two ports I met with very few specimens. Several *Naticas* are confined to Inhambane and Natal.

I have already noticed some of the peculiarities of Port Natal; of 96 species I collected there, I found 33 in the tropics, and less than half that number at Algoa Bay, not more than one or two species being common to Natal and Cape Town. Between Algoa Bay and Mossel Bay there is little or no difference. Between these ports and Cape Town there is a very great difference, more however in the species than in the genera.

Cape Point appears to form a barrier, on each side of which the mollusca differ, as do the Algae (Harvey) and Fishes (Pappe.) This is a subject of very great interest, but it is impossible to enter into it thoroughly in a paper of this length.

A LIST OF WEST AFRICAN SHELLS, INCLUDING THREE NEW PLEUROTOMÆ AND ONE NEW *COLUMBELLÆ.*

By F. P. MARRAT.

The shells here recorded were collected by Captain Davis, of Liverpool, from Madeira to the Gulf of Guinea.

This list is a continuation of the one published by my friend Mr. Edgar Smith, of the Zoological Department, British Museum, P.Z.S., 1871, p. 737.

	Other Localities.
1 Venus crenulata, <i>Chem.</i>	W. Indies, <i>Reeve.</i>
2 " verrucosa, <i>L.</i>	
3 V. (Callista) striata, <i>Gray.</i>	
4 V. (Circomphalus) lamellata, <i>Lam.</i>	
5 Cardium costatum, <i>L.</i>	East Africa.
6 C. (Pectunculus) ringens, <i>Chem.</i>	
7 C. (Lævicardium) pectinatum, <i>L.</i>	
8 C. do. elenense, <i>Sow.</i>	St. Elene, <i>Sow.</i>
9 C. (Fulvia) radiatum, <i>Reeve.</i>	
10 Dosinia africana, <i>Gray.</i>	
11 D. torrida, <i>Reeve.</i>	
12 Lucina (Cyclas) divaricata, <i>L.</i>	
13 L. do. gibba, <i>Gray.</i>	
14 L. (Codakia) pecten, <i>Lam.</i> ; var. reticulata, <i>Poli.</i>	
15 Tellina (Macoma) plebeia, <i>Hanley.</i> Quite as rosy as any figured.	
16 Ungulina alba, <i>Rang.</i>	
17 Paphia mitis, <i>Desh.</i> Locality not previously recorded.	
18 Mactra (Spisula) sublanceolata, <i>Deh.</i> Do.	
19 Radula (Mantellum) orientalis, <i>Ad. & Reeve?</i>	
20 Spondylus unicolor, <i>Sow.</i>	
21 Macha strigillata, <i>L.</i>	
22 Leda bicuspidata, <i>Gld.</i> Locality not stated in Reeve.	
23 Axinæa formosa, <i>Reeve.</i> A small and very beautiful shell.	
24 Corbula sulcata, <i>Lam.</i>	
25 Actinobolus (=Cardita, <i>Lam.</i>) lacunosus, <i>Reeve</i>	
26 Do. do. sp. ?	
27 Mytilicardia variegata, <i>Brug.</i>	
28 Arca pacifica, <i>Sow.</i> , var., with the ribs strongly noduled.	

Other Localities.

- 29 *Arca (Senilia) senilis*, *L.*
 30 *A. (Scapharca) nux*, *Sow.* W. Indies, R.P.M., S. America, *Sow.*
 31 *Pinna rudis*, *L.* W. Indies.
 32 *Procellaria* sp. ?
 33 *Avicula atlantica*, *Lam.* Australia, *Jukes.*
 34 *Terebra corrugata*, *Lam.* As usual, this shell is imperfect.
 var., very narrow and quite perfect, about 12 specimens.
 35 *T. (Hastula) festiva*, *Desh.*
 36 *T.* do. *cinerea*, *Born.*
 37 *T.* do. *micans*, *Hinds.*
 38 *T.* do. *strigillata*, *L.*, very narrow.
 39 *T.* do. *gracilis*, *Gray.*
 40 *T.* do. *cuspidata*, *Hinds.*
 41 *T. (Acus)* *senegalensis*, *Lam.*
 42 *T.* do. *duplicata*, *L.*
 43 *T. (Abretia) lepida*, *Hinds.*

44 *Pleurotoma (Drillia) rosolina*, n. s.

P. testa turrita, acuminata, rosea; anfractibus longitudinaliter costatis et transversim striatis, costis obliquis, prope suturas concavis; apertura brevi, fave rosea; profunde emarginato. Eximia venustate.

Hab. West Africa. Captain Davis.

This very beautiful shell resembles *P. rosea*, *Sow.*, from which it differs in being obliquely ribbed, closely striated and of a uniform rose colour.

45 *Pleurötoma (Drillia) excentrica*, *Sow.*

Galapagos Islds.

46

Pleurotoma gracilis, n. s.

P. elongato-fusiformi, gracilis, cinerea inter nodulis fusco-maculata; anfr. plicato-nodulosis. cerebrime striatis, spira elongata, canali acuminata; labro margine acuto, sinu ampio.

Hab. West Africa. Captain Davis.

This very slender shell is not like any of the forms figured.

47

Pleurotoma (Drillia) filosa, n. s.

P. testa acuminato-turrita; anfr. convexis, carinis numerosis prominentibus cinctis, interstitiis angustatibus, striis longitudinalibus obliquis eleganter sculptis; albida, apice fuscescente tincto; canali brevissimo; sinu ampio.

Hab. West Africa.

A white shell, corded with transverse thread-like bands. The *Pl. violacea*, Hinds, *Pl. crispata*, Crist. & Jan., and several others are similarly corded and closely allied shells.

48 *Pleurotoma (Clavatula) diadema, Kien.*

49 *P.* do. *virginea, Chem.*

50 *P.* do. *imperialis, Lam.*

51 *P.* do. *muricata, Lam.*

52 *P. (Genota) mitraeformis, Wood.*

53 *P. (Perrona) spirata, Lam.*

54 *P.* do. *mandarina, Smith.*

55 *P.* do. *Perronii, Chem.*

Other Localities.

- 56 *Latirus filosus*, Schub. & Wag.
 57 *Cymiliun proboscidale*, Brod.
 58 C. porcinum, Lam.
 62 *Melo neptuni*, Gmel.
 60 *Murex tumulosus*, Sow.
 61 M. (Phyllonotus) rosarium, Chem.
 62 M. do. angularis, Lam.
 63 M. (Rhinocanthus) cornutus, L.
 64 *Bullia (Leiodomus) turrita*, Gray.
 62 B. (Dorsanum) icterica, Solander.
 66 *Nassa aethiopica*, Marrat.
 67 N. Webbei, Petit.
 68 N. sesarma, Marr.
 69 N. argentea, Marr.
 70 N. minor, Marr.
 71 *Cyllene lyrata*, Lam.
 72 *Phos candeana* D'Orb. The *P. antillarum* and *grateloupianus* Petit, are only varieties.
 73 *Purpura (Thalessa) guinensis*, Wag.=coronata, Lam.
 74 *Pseudoliva sepimenta*, Rang.
 75 *Fusionella nifat*, Adanson, and var. *scalarina*.
 76 P. curvirostris, Marr. Type in the Free Publ. Mus., Liverpool.
 77 P. buccinata, Lam.
 78 P. aculeiformis, Lam., and var. white. Australia.
 79 P. subgranulata, Petit. My specimens have three or four grooves below the sutures.
 80 P. milleti, Petit.
 81 P. catalina, Petit. The whole of these species, are very like varieties.
 82 *Oliva (Agaronia) megalostoma*, Meusch=hiatula, Lam.
 83 O. (*Olivella*) leucozonias, Gray.

84 Mitra (Nebularia) badia, *Reeve?* young.

85 M. (Ziba) carinata, *Swain.*

86 Columbella rustica, *L.*

87 **Columbella (Anachis) cuspidata, n. s.**

C. testa elongato-fusiformi, utrinque attenuata, apice cuspidata : anfractibus longitudinaliter costatis et transversim sulcatis, costis subgranulatis ; fulva fusco maculata vel pallide cinerea, epidermide leucophaea ; columella arcuata, labio cum callo circumscripto tecto ; apertura angusta ; labro intus lirato.

Hab. West Africa. Captain Davis.

- | | |
|---|-------------------------|
| 88 Marginella (Gabella) Cumingiana, <i>Petit</i> | } two v. of one species |
| 89 M. do. helmatina <i>Rang.</i> | |
| 90 M. do. <i>Petitii, Duval.</i> | |
| 91 M. do. <i>limbata, Lam.</i> | |
| 92 M. do. <i>splendens, Sow.</i> | |
| 93 M. do. <i>Bellii, Sow,</i> | |
| 94 M. do. <i>Tyermani, Marr.</i> | |
| 95 M. do. <i>faba, L., var. Digsii, Marr.</i> | |
| 96 M. do. <i>Davisiana, Marr.</i> | |
| 97 Marginella irrorata, <i>Menke.</i> | |
| 98 M. nodata, <i>Hinds.</i> | |
| 99 M. musica, <i>Hinds.</i> | |
| 100 M. cleryi, <i>Pctit.</i> | |
| 101 M. (Cryptospira) diodochus, <i>Ad. & Reeve.</i> | |
| 102 M. (Volutella) cornea, <i>Lam.</i> | |
| 103 M. (Persicula) guttata, <i>Link.</i> | |
| 104 M. persicula, <i>L.</i> | |
| 105 M. (Volvarina) quadrifasciata, <i>Marr.</i> | |
| 106 M. do. suavis, <i>Sow.?</i> | |

Other Localities.

- 107 *Marginella (Volvarina) capensis*, *Krauss*, var. S. Africa.
A smaller and more solid shell than the type.
- 108 M. do. *Dunker*, *Krauss*?
- 109 *Doliolum melanostoma*, *Fay*. Australia.
- 110 *Cassis spinosa*, *Dish*. Do.
- 111 C. (*Cassidea*) *testiculus*, *L*. West Indies.
- 112 *Natica gambiae*, *Recluz*.

113 *Natica obliquata*, n. s.

N. testa subampliter umbilicata, oblique globosa, laxe convoluta, spira parva, subimmersa, sutura impressa; anfr. rotundatis, longitudinaliter dilatatis; apertura oblongo-ovata; columella callosa, callositate columnari spirali umbilicum intrante; alba, epidermide tenui fulva induita; operculum testaceum.

Hab. West Africa.

In form this shell resembles the *N. orientalis*, Gmel., but the likeness goes no further. Its small size, thin substance and peculiar form, will serve as distinctive characters.

- 114 *Natica cassra*, *Marr*.
- 115 N. *faba*, *Marr*.
- 116 N. *variabilis*, *Recluz*.
- 117 N. *genuanus*, *Reeve*.
- 118 *Naticina semipellucida*, *Marr*.
- 119 *Cantharus (Tritonidea) variegatus*, *Gray*.
- 120 C. do. *ruginosa*, *Reeve*. Red Sea.
- 121 C. do. small spe.?
- 122 *Obeliscus dolobratus*, *L*.
- 123 *Conus (Chelyconus) guiniacus*, *Hwass*, var.
- 124 C. (*Dendroconus*) *papilionaceus*, *Hwass*.

Other Localities.

- 125 *Cancellaria cancellata*, *Lam.*
 126 C. *piscatorum*, *Chem.*
 127 *Cypraea lurida*, *L.* W. Indies, Mediterranean.
 128 C. (Aricia) *rattus*, *Lam.*
 129 C. (Luponia) *zonata*, *Chem.*
 130 *Mezalia brevialis*, *Lam.*
 131 *Eglesia spiralis*, *Sow.* Coll. Keen. West Indies, *Reeve*.
 132 *Turritella undulina*, *L.*, light and dark vars.
 133 T. *annulata*, *Kirn.*
 134 T. *cornea*, *Lam.* A large variety. Mediterranean.
 135 T (Zaria) *triplicata*, *Stud.*
 136 *Protoma Knockeri*, *Baird.* 5 or 6 specimens, very rare.
 137 *Crypta porcellana*, *L.*
 138 *Concholepas*
 139 *Strombus fasciatus*, *Gmel.* (= *bubonius*, *Reeve*) with operculum.
 140 *Clanculus agrestis*, *Chem.*
 141 *Bulla Adansonii*, *Phil.*
 142 *Philine aperta*, *L.* Britain, Mediterranean.
 143 *Cyllichna*, sp. ?
 144 *Mitra (Nebularia) thiodia*, *Reeve*. Locality hitherto unrecorded

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DESCRIPTION OF A NEW FORM OF *GLADIUS*,
KLEIN=ROSTELLARIA, *LAM.*

By F. P. MARRAT.

G. Martinii, n. s.* (Plate I.)

*G. testa fusiformi, pallide luteo-spadicea, superne fascia livida
 obscura prope suturam cingulata, spira turrita; anfr. rotundatis,*

* Named after S. TRICE MARTIN, Esq., from whom I obtained it, and who has the second and only other specimen known.

Pl. I.



J. Chard, del.

GLADIUS MARTINII.



subinflatilis, omnibus creberrime transversim punctato-striatis, concinne cancellatis, prope suturas bisulcatis, ultimo tumidiusculo, late expanso; labro quinque vel sexdentato, extus fusco-maculato, superne calloso brevi caniculato-producto et crispato; columella arcuata, alba, saepe pallide castanea; canali breviusculo, vix recurvo.

Hab. Cebu, Philippines.

This very remarkable shell differs altogether from all those in the same genus with it, as follows ; the upper whorls are not costate, the striae are very closely placed and remarkably fine, the aperture is very elongated, the teeth are set on the outer edge of the lip, the callus does not reach the suture of the body whorl, and the transverse striae are punctate.

These shells, for there are two of them, are all the more interesting in consequence of having been dredged from the ground on which many of the rarest and most curious, as well as the most beautiful, sponges were found. *Hyalonema cebuensis*, T. Higgin; *Meyerina claviformis*, Gray; *Rossella philippinensis*, Gray; and *Labaria hemisphærica*, Gray; have all been received by Mr. Martin himself, from this locality, and are in the Free Public Museum of Liverpool. It is also well known as the birth-place of the lovely *Euplectella aspergillum* of Owen.

Limax gagates at Hastings.—In the latter part of July, my valued correspondent, Miss Fairbrass, of Faversham, sent me amongst some other mollusca taken by her at Hastings, a living specimen of a slug that she was not able satisfactorily to identify. This on examination proved to be *Limax gagates* of Drap., and adds another locality to those recorded for this local species.

JNO. W. TAYLOR

NOTE ON *BULIMUS GOODALLII*.

By J. E. DANIELS.

This spring I received, through the kind offices of the Editor of "The Garden," a small parcel of shells, marked "Cucumber Snails." Some of the examples were of so large a size, that at first, I almost imagined they were *Spiraxis Swiftiana*, Pfr., also a West Indian animal, but after a careful examination and comparison with examples which had been procured from Messrs. Garraway's nurseries, Clifton, I have come to the conclusion that they are *Bulimus Goodallii*. The largest example measures 7-20th inch. whereas none of my other specimens exceeds 4-20th. These also are a clear white in colour, whereas the British specimens are more of a yellowish brown colour. Unfortunately I cannot put my hand upon the paragraph in "The Garden" in which a notice of this snail first appeared, but the impression left on my mind, was that they devoured the young shoots of the cucumber plants, and further that they were found in a cucumber house belonging to a highly scientific and horticultural loving gentleman, at Weybridge, Surrey. Now, if this is the case, they must feed on different substances. Those at the Durdham Downs Nursery, according to Gray's Turton (p. 6,) the late Mr. Miller was in the habit of feeding on small dead worms, and when he wanted a supply for his friends, "he merely placed a flat board upon the surface of the tan, and left two or three small dead worms beneath it, and never failed of finding it covered in a few days." They were first discovered by Mr. Miller in 1822, but had, I see, previously been discovered by a Mr. Drummond, to whom, I see, the above remarks belong; but although, at that time, I was a child of only five years of age, or very shortly after, I remember Mr. Miller telling my father and also showing them to me, and at the same time, searching about and finding an example of *Testacella*, and telling us that both these animals fed upon

worms, and how useful they were in a garden, and for many years I never killed a slug without carefully examining it, in the ~~hope~~ of finding a worm-eating slug with a limpet's shell on its back.

Now the question arises whether they are different species, or omnivorous, that is, both carnivorous and vegetarian?

I have a vague idea that some authorities consider the genera *Glandina* and *Spiraxis* as carnivorous.



NOTE ON *CLAUSILIA BIPLICATA* VAR. *ALBIDA*.

By J. E. DANIELS.

During my residence at Heidelberg, I found several examples of this variety, and as might be expected from a species so numerous and abundant as it is in that district, several other slight variations in colour. One example I still retain in my cabinet of a pale fawn colour, almost transparent, and only half the usual length, owing to its having, from some cause, discontinued forming shell; the mouth is otherwise perfect. Any of your readers having time and opportunity, should visit the woods at Neckarau, a village nearer Mannheim than Heidelberg, where they will find the lovely banded forms of *Helix fruticum* and *Helix villosa* in great abundance.

And as no doubt they are lovers of nature generally, they will be much amused and interested in watching and possibly endeavouring to catch some of the exquisite green tree-frogs. One drawback, if they are thin-skinned, is that mosquitoes or huge gnats, or some other abominations of that kind swarm, and on myself personally produced unpleasant sensations.



Clausilia biplicata var. *albida*.—Just four years since I was staying for a short time at Heidelberg, and on a wet day, such as conchologists love, in the Castle grounds, among other treasures I found six or eight specimens of *Clausilia biplicata* var. *albida*.

In June 1875 I was again there, but found only a single specimen.—[MRS.] J. FITZGERALD.

Helix hortensis monst. *sinistrorsa* at Bristol.—In a former number of this Journal (No. 6, p. 92) I mentioned finding a reversed *Helix hortensis* of a plain yellow color in Parry's Lane, Bristol; also that my sister had found a similar specimen a few months previously at Heynsham.

Last evening (August 7th), a very heavy rain having fallen during the day, I started on a snail hunt and was richly rewarded by taking near Horfield, a very beautifully banded sinistral *Helix hortensis*.—[MISS] FANNY M. HELE, Bristol.

Helix aspersa monst. *sinistrorsa* at Bristol.—In November last, whilst searching an hedgebank for *Clausilia*, a large and almost black, reversed *Helix aspersa* rolled into my hand. It was a fine specimen, but unfortunately dead.—[MISS] FANNY M. HELE, Bristol.

Bullimus obscurus v. *alba* at Bristol.—Last autumn my sister discovered a locality for this rare shell in Leigh Woods, near Clifton.—[MISS] FANNY M. HELE, Bristol.

Cochlicopa lubrica v. *hyalina* at Llandudno.—In July 1877 I found a single example of this variety under a stone by the roadside at Tan r allt near Llandudno. This I have had the pleasure of placing in the cabinet of my friend Mr. John W. Taylor.—WM. DENISON ROEBUCK, Leeds.

LAND SHELLS OF CAPRI.

By MRS. J. FITZGERALD.

It may interest some of your readers to have a list of the land shells found at Capri. This tiny island, situated in the most beautiful Bay of Naples, is richly endowed by nature, and is one of the most beautiful spots that I have ever visited. Its scenery defies description, combining bold precipitous cliffs rising abruptly from the sea, smiling vineyards, palm trees and orange-groves, with ruins of classic times and the remains of castles celebrated in the wars of the first Napoleon.

It has even the remnant of a Persian Temple dedicated to the sun.

Over this reigns a charming climate, where no ice or snow is found, where over 800 species of wild flowers are distributed, and 34, at present known species of land shells and one of freshwater have been discovered. Of these the most interesting and distinct is that of *Helix elata*, only found at Capri and Sicily. It is a very exquisite little pyramidal shell with each whorl separated by a ridge and beautifully striated. And it is always beautiful, even in its earliest form, with a finished look in its infant stage that most species do not possess. My stay in the island was too limited to obtain all the species, but my friend Dr. Cerio has assisted me in forming the list, and he gave me much valuable information as to the localities the species inhabited.

- 1 *Limax maximus*, L.
- 2 *L. agrestis*, L.
- 3 *L. marginatus*, Müll.
- 4 *Testaclea drymossiae*.
- 5 *Helix Lefeburiana*, Fer. (rare).

- 6 *Helix aspersa*, *Müll.* (larger than ours).
 - 7 *H. vermiculata*, *Müll.*
 - 8 *H. aperta*, *Born.*
 - 9 *H. circumornata*, *Fer.*
 - 10 *H. cartusiana*, *Müll.*
 - 11 *H. pyramidata*, *Drap.* (very beautiful and rare).
 - 12 *H. turbinata*, *Jan.*
 - 13 *H. lenticula*, *Fer.*
 - 14 *H. striata*, *Drap.*
 - 15 *H. sorrentina*, *A. Schmidt.*
 - 16 *H. variabilis*, *Drap.*
 - 17 *H. elata*, *Faure-Biguet*, (peculiar to Capri and Sicily).
 - 18 *H. amta*.
 - 19 *H. rupestris*, *Drap.*
 - 20 *H. candidissima*, *Drap.*, (rare).
 - 21 *H. cinctella*, *Drap.*, (rare).
 - 22 *Hyalina Draparnaldi*, *Beck.*
 - 23 *Bulimus decollata*, *L.*
 - 24 *Bulimus quadridens*, *Müll.*
 - 25 *Bulimus acutus*, *Müll.*
 - 26 *Pupa avena*, *Drap.*
 - 27 *Pupa granum*, *Drap.*
 - 28 *Pupa Philippi*, *Cantr.*
 - 29 *Cionella acicula*, *Müll.*
 - 30 *Cionella folliculus*, *Gronov.*
 - 31 *Cyclostoma elegans*, *Müll.*
 - 32 *Clausilia cinerea*, *Phil.*
 - 33 *Clausilia paestana*, *Phil.* (rare).
 - 34 *Clausilia papillaris*, *Müll.*
 - 35 *Bythinia similis*, *Drap.*
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DESCRIPTIONS OF NEW SPECIES OF LAND SHELLS
FROM THE EAST COAST OF AFRICA.

By JOHN W. TAYLOR.

Mr. J. S. Gibbons, M.B., of Southampton, who for some time resided on the Eastern coast of Africa, and availed himself of the opportunities he possessed to make a collection of the shells of that region, has placed in my hands for description and publication such of the species as appear to me to be new.

Mr. Edgar A. Smith, F.Z.S., has, with his customary courtesy looked over the shells, and was unable to refer them to any species in the British Museum collections.

The tropical Eastern coast of Africa and adjoining islands, form, according to Woodward, one province. The mainland, though possessing all the requisites for a numerous molluscan fauna, is singularly destitute of species, and appears to have less variety than any other part of the world as favourably situate.

Twenty-eight species of land shells have been recorded from this region to the present time. Thanks, however, to the researches of Mr. Gibbons this number has been considerably increased, and several genera not hitherto accredited to Eastern Africa have been discovered to exist there.

With the exception of the *Achatina*, the land shells are insignificant in size and coloring, the species also being usually confined to small areas and seldom plentiful.

About Zanzibar, *Achatina* is the only shell generally diffused, *Bulimi*, *Pupa*, &c., being restricted to small areas on the coast and to the coral islets.

In the preparation of the remarks and descriptions in this notice, I have availed myself largely of the very excellent and accurate descriptive notes prepared by Mr. Gibbons.

Gonaxis, Taylor.

SHELL pupiform, unsymmetrical, *axis* of the apical whorls diverted to the right, lower aspect of penultimate whorl of a somewhat triangular shape, forming a prominent hump on the left side.

The most important character of this genus is the deflection of the upper or apical whorls, whereas in *Streptaxis* it is the last whorl only that is diverted from the perpendicular.

This peculiarity appears to me to be of sufficient importance to warrant the erection of this genus.

There has been some little uncertainty as to the systematic position of *Streptaxis*, Messrs. Adams placing it in the subfamily *Helicinae*, while Prof. von Martens in his edition of "Albers' Heliceen," places it next *Pupa* and quite remote from *Helix*.

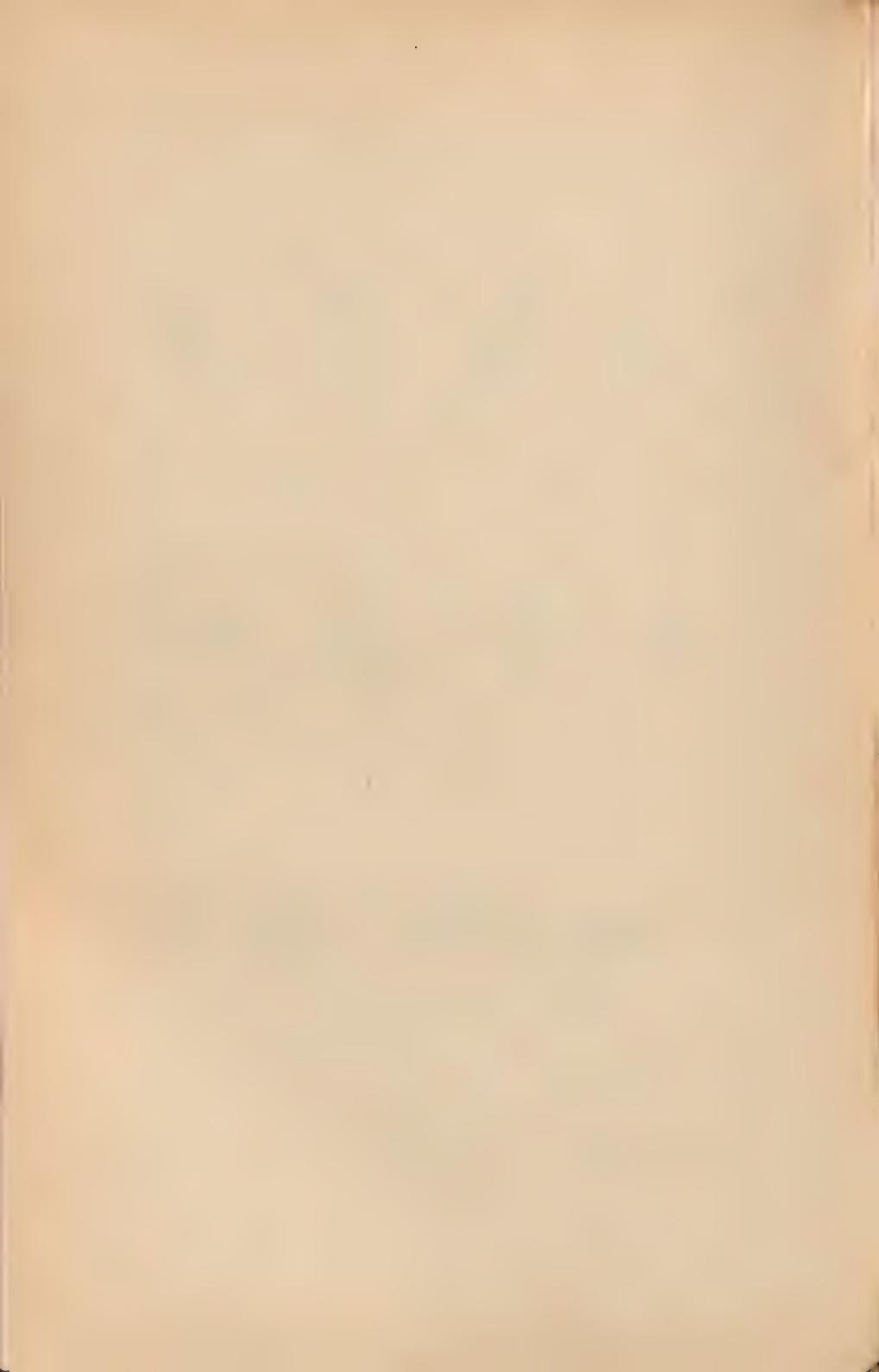
Gonaxis Gibbonsi, n. s. (Plate II, fig. 1).

ANIMAL small; body of a light dull yellowish: all four tentacles and head of a dull brick red colour.

SHELL elongate, cylindrical, thin and shining, semitransparent, slightly opalescent, smooth, but with a few slight irregular wrinkles in the line of growth: epidermis very thin: whorls $5\frac{1}{2}$, unsymmetrical, the body whorl very oblique, narrow in front, very broad and flattened behind aperture: penultimate whorl very broad and oblique, forming a large hump on the left side of the shell; remaining whorls small and compressed; the nucleus is rounded and placed on the right side of the shell, suture deep, very oblique, crossed by numerous short prominent plicæ; mouth oblong, longer than broad, rounded in front, squarish behind: lips almost parallel, slightly curved, thickened and a little everted, forming a smooth rounded rim, connected by a slight callus: umbilicus small, shallow, partly concealed by the inner lip.



1 *GONAXIS¹ GIBBONSI.* 2 *ZONITES^(?) VENTROSA.* 3 *BULIMINUS OBESA.*
4 *B. TUMIDUS.* 5 *B. OLIVACEUS.*



Length 0.275, breadth 0.175.

Hab. Zanzibar.

Mr. Gibbons found but three specimens of this interesting species, all in one spot amongst dead leaves, of which only one was living. Mr. Sheppard, of H. M. S. London, found specimens of this species at the roots of Banana trees.

I have very great pleasure in associating with this interesting species the name of its discoverer.

Its nearest ally is *Streptaxis Kirkii*, Dohrn, from Lake Nyassa, from which it is, however, quite distinct.

Zonites (?) ventrosa, Gibbons, MS. (Plate II. fig. 2).

SHELL depressed, rounded, thin and glossy, of a deep rich brown colour, with faint transverse striæ, strongly marked at the suture; *whorls* four, slightly convex, inflected above, the last occupying half the shell: *periphery* rounded: *base* very convex: *spire* depressed: *apex* obtuse, rounded: *suture* broad and very deep: *mouth* lunate, nearly as long as broad: the *peristome* semicircular, thin and direct except near the umbilicus where it is reflected: *umbilicus* deep and very broad disclosing the interior of the spire.

Length 0.175, breadth 0.1.

Hab. Zanzibar.

Mr. Gibbons found but a single specimen of this *Zonites*, dead, amongst dead leaves. Mr. Sheppard has, however, taken living specimens at the roots of banana trees.

Buliminus olivaceus, Gibbons, MS. (Plate II., fig. 5).

ANIMAL white, or yellowish white, opaque.

SHELL, oblong-conical, thin, glossy, semitransparent, of a darkish horn colour, distinctly and regularly striate transversely: *epidermis* rather thin, distinct: *whorls* eight, rounded, the last large

forming more than $\frac{1}{3}$ length of the shell: *spire* tapering: *apex* obtuse: *suture* deep: mouth elliptical, somewhat pointed below: *peristome* thin, direct: *outer lip* slightly curved: *inner lip* reflected and partially covering the umbilicus: *umbilicus* tubular and deep.

Length 0.762, breadth 0.312 in.

Hab. Bawri Island, Zanzibar, Channel.

Occurs amongst dead leaves, in old marine shells and under bushes, but rarely alive. Mr. Gibbons has not found it at Zanzibar nor on any of the other coral islands. It appears to be confined to Bawri.

The epiphragm secreted for hibernation is calcareous, white, very strong and solid, bears no slit in the middle like that of *Achatina*, is convex and level with the peristome.

***Buliminus tumidus*, Gibbons, M.S. (Plate II, fig. 4).**

SHELL conically-turrite of a brown, colour, transversely striate in the line of growth: *striae* slight and irregular: *epidermis* distinct: *whorls* seven, very convex, compressed: *body whorl* large and tumid, occupying less than half the length of the shell: *spire* tapering: *apex* rather acute: *suture* deep and distinct: mouth ovate, rather broad: *peristome* thin and direct: *inner lip* reflected partly concealing the umbilicus: *umbilicus* large and very deep.

Length 0.5, breath 0.3.

Hab. Zanzibar and on Chapani I.

Occurs sparingly about Zanzibar, but dead only. Mr. G. also found specimens on one of the coral islets (Chapani Island) with *Bulimus punctatus*, Anton, *Helix Mozambicensis*, Pfr., &c., but it did not occur on Bawri Island.

It is distinguished from the preceding species by the greater convexity and compactness of its whorls, and by its smaller and rounder body-whorl.

Buliminus obesa, *Gibbons*, MS. (Plate II, fig. 3).

SHELL ovato-oblong, thick and solid : colour? : surface smooth but with indications of irregular transverse striae : epidermis? whorls $6\frac{1}{2}$ —7, swollen, rounded : body whorl large, contracting towards the front; penultimate nearly equally large, broader, rather unsymmetrical, the two preceding whorls are much smaller: apex abruptly rounded: suture moderate, distinct, shallow; mouth squarely ovate, with a thickened everted peristome joined by a callus: outer lip nearly straight: inner lip a little oblique: umbilicus deep and distinct, rather narrow.

Length 0.825, breadth 0.45.

Hab. Bawri Island, Zanzibar.

Mr. Gibbons only obtained two specimens of this fine species dead and very aged.



BIBLIOGRAPHY.

THE "VALOROUS" EXPEDITION.

On some new and remarkable North Atlantic Brachiopoda.—New and peculiar Mollusca of the Pecten, Mytilus, and Arca Families.—New and peculiar Mollusca of the Kellia, Lucina, Cyprina and Corbula Families.—New and peculiar Mollusca of the Order Solenoconchia.—New and peculiar Mollusca of the Patellidae and other Families of Gastropoda.—New and peculiar Mollusca of the Eulimidae and other Families of Gastropoda, as well as of the Pteropoda, by J. Gwyn Jeffreys, LL.D., F.R.S., F.L.S., F.G.S., &c., &c.

In this series of deeply interesting and valuable papers are embodied the results of the deep sea dredgings, instituted under the

direction of Dr. Jeffreys during the cruise of the "Valorous." As the result of these dredgings, 46 species, new to science, were discovered and are here described by Dr. Jeffreys.

In addition to the three genera previously noted at p. 224, a genus is established for the reception of a species of *Mytilidae*, viz.:

Idas, Jeffreys.

Resembles *Arcæ* in shape, the hinge plate crenated on both sides the beak, cartilage none.

The revolution in our ideas caused by the prolific results of the recent examinations of the deep sea, in which Dr. Jeffreys has taken so prominent and honorable a part, has shown that the greatest depths teem with a numerous fauna, and that the abysses of the ocean retain in a living state many species of mollusca hitherto supposed to be extinct and previously known only by their fossil remains.

A very full and carefully compiled synonymy is given of the species enumerated, and the different depths and localities at which the various species have been obtained in the present as well as former expeditions are all furnished.

The whole series contain a wealth of information on the deep sea mollusca, and is one of the most important contributions to science that has appeared for some time.

The following is a list of the new species, omitting those previously mentioned at p. 224.

Seguenzia formosa, *Seguenzia carinata*, *Cerithium procerum*, *Lima-cina helicooides*, *Terebratula tenera*, *Amussium lucidum*, *Lima subovata*, *Idas argenteus*, *Leda pustulosa*, *L. lata*, *L. sericea*, *Limopsis tenuella*, *L. cristata*, *Diplodonta Torelli*, *Poromya rotundata*, *Pecchiolia gibbosa*, *P. tornata*, *Neara striata*, *N. exigua*, *N. notabilis*, *N. circinata*, *N. papyria*, *N. angularis*, *Dentalium capillosum*, *D. ensiculus*, *D. subteressum*, *Cadulus tumidosus*, *C. gracilis*, *C. cylindratus*, *Puncturella profundi*, *Scissurella tenuis*, *Cyclostrema basistriatum*, *Acirsa praelonga*.

Journal de Conchyliologie, April, 1877.

CROSSE.—Catalogue des Mollusques qui vivent dans le détroit de Behring, et dans les parties voisines de l'Ocean Arctique (Catalogue of the Mollusca of Behring's Straits and the neighbouring parts of the Arctic Ocean), pp. 101—128.

118 species are enumerated; they are, as is natural, of an Arctic character.

BAUDON.—Monographie des Succinées françaises (Monograph of the French Succinæ—continued), pp. 128—198.

The author gives full descriptions, accompanied by 5 coloured plates of figures, of all the species and varieties of *Succinea* inhabiting France, going, we think, much too minutely into detail for a paper in a journal of general circulation. With reference to our notice of the first part (Q. J. C., p. 228) we must no acknowledge that we think that the difference between *S. Yafferi* and *S. elegans* has been proved. *S. acrambleia*, however, which turns out to be Mabille's species, is merely *S. Psiifféri* (compare figs. 4 and 5 of Plate 7). *S. parvula* is a var. of *S. putris*. *S. Baudoni* certainly differs from *S. arenaria*; it is very like the var. *parvula* of *S. putris*. Much space is wasted by long lists of references to local catalogues, etc.

FISCHER.—Note sur la sinistrorité des coquilles des jeunes *Planorbis* (Note on the initial solution of *Planorbis* shells), pp. 198—200.

From an examination of embryonal shells of *P. cornutus*, the author considers the shell of *Planorbis* is sinistral. With praiseworthy candour he mentions the fact of all the spiral shells of *P. complanatus* found at Magnée being dextral. May not the true solution of the question be that some species, or perhaps even as in *Amphidromus*, some individuals are dextral and others sinistral?

FISCHER.—Note sur le genre *Mörchia* A. Adams, etc. (Note on the g. *Mörchia*), pp. 200—203.

Dr. Fischer adds two new species, *M. Morleti* (Plate 4 fig. 1) and *biplicata* to the one hitherto known, *M. obvoluta*, A. Adams. The new species are from China. He considers that the name *Mörchia* should be preserved for the group in question, as Mayer's *Mörchia* is 3 months posterior, and that the group is a distinct genus and not a subgenus of *Cyclostrema*.

FOLIN.—Note relative au genre *Parastrophia* (Note respecting the g. *Parastrophia*), pp. 203—207.

The Marquis de Folin considers that the genera *Cæcum*, *Meioceras*, *Strebloceras*, and *Parastrophia* are clearly separated by the form and position of the nucleus. That of *Parastrophia* is much smaller than those of the other genera, and looking at the shell in front appears bent backwards, whilst in *Cæcum* and *Meioceras* it inclines to the front, and in *Strebloceras* turns to the side.

MÖRCH.—Description d'une nouvelle espèce du genre *Fastigiella*, Reeve (A new *Fastigiella*), pp. 207—209.

F. Poulsenii from Eleuthera, Bahamas.

MÖRCH.—Observations sur l'*Ancylus Gussoni*, Costa, et le nouveau sous-genre *Allerya* (*Ancylus Gussoni* and the new s. g. *Allerya*), pp. 209—211.

Dr. Jeffreys considers the *A. Gussoni* to be the same as *Textura virginata* Müller, but Dr. Mörch thinks they belong to different genera. In Costa's species the apex is posterior (not anterior as in *Textura*). The muscular impression is very narrow, horse-shoe shaped, and terminates in front on each side by a round impression.

The author proposes a new subgenus of *Piliscus* for this shell, to which he gives the name of *Allerya*, and he describes a second species of the subgenus—*Piliscus (Allerya) Krebsi*, Mörsch, from St. Thomas, W. I., and Barbadoes.

FISCHER.—Sur une anomalie de l'animal de l'*Helix nemoralis* (An anomaly of the animal of *H. nemoralis*), pp. 211—212.

An adult *H. nemoralis* was found provided with a small fleshy column, about 1 centimetre = $\frac{2}{5}$ ths of an inch long, capable of contraction and extension, truncate at the extremity, and situated towards the root of the tail and a little behind the shell. When the animal was crawling, the appendage was almost vertical.

MORELET.—Addition à la Faune de l'île Maurice (Addition to the Mauritius Fauna), pp. 212—217.

These are all subfossil shells, viz., *Cyclostoma articulatum*, Gray (living in the Island of Rodriguez); *C. unicolor*, Pfeiffer, habitat hitherto unknown; *C. Lienardi* n. sp., (Plate 4 fig. 2); *C. cincinnatum*, Sowb., locality previously unknown, perhaps not yet extinct; *Melampus corticinus* n. sp.

MORELET.—Coquilles nouvelles de Madagascar (New shells from Madagascar), pp. 217—219.

Helix funebris (near *H. Sganziniana*, Cr. and F.); *H. cerina*; *Cyclostoma Crosceanum*; *C. chromium*; *Megalomastoma litturatum*.

Under the head of correspondence and news we gather the following:—

1.—*Vitrina Ruivensis*, Couthouy, of Madeira is quite distinct from *V. Lamarckii*, Vér, of Teneriffe.

2.—Two more varieties of *Succinea oblonga* are named and described!! Quousque tandem!

3.—*Pedicularia sicula* has been found near the Hyères Islands (Var, Provence).

4.—The Van Lennep collection sold for £1,600.



Journal de Conchyliologie, July, 1877.

HEROUARD.—Sur les courants de nutrition des *Brachiopodes* (The nutritive currents of the *Brachiopoda*), pp. 229—241.

The author has discovered that the form and direction of these currents are different in the various genera of Brachiopoda.

MORELET.—Révision des Mollusques terrestres et fluviatiles du Portugal. (Revision of the land and fresh-water Mollusca of Portugal), pp. 242—261.

A very interesting article, supplementary to the author's work on the same subject. M. Morelet now considers the *Arion Lusitanicus* to be a good species, but rejects all the other fanciful species of *Arion* proposed by Mabille in the *Revue Zoologique*. *H. crystallina*, var. *major*, Mor. = *H. pseudohydatica*, Bourg.; *H. candidula* of the former work is a small var. of *H. caperata*, Mont.; *H. ponentina*, Mor. = *H. revelata*, Féér. (a thick shelled var.); *H. codia*, Bourg. is nothing but *H. caperata*; *H. vermiculata* Müll. M. Morelet rather doubts that this has been found in Portugal; *Pupa secale*, Drap., has not, as yet, been found in Portugal, and the name should be erased from the list and replaced by *P. Lusitanica* Rossm.; *Ferussacia Vescoii*, Bourg. = *F. folliculus*; *Planorbis cornutus*, L., an error, should be *P. Metidjensis*, Forbes; *Hydrobia acuta* Drap., most impudently per-

sists in living in Portugal, "malgré les dents" of the *Revue Zoologique*; *Hydrobia gibba*, Drap., is guilty of similar impertinence; *Unio Wolweichi* and *U. tristis* should be struck out of the list, the former being exotic (probably Australian), and the latter a young *U. margaritifer*. 34 species are added to the Portuguese list; the most interesting are *Limax Lusitanus* and *Bocagei*, Silva, *Helix ciliata*, Venetz, *II. circumflexa*, Shutt. (previously only found in the Canaries), *Pupa substriata*, Jeffr., *Clausilia Moniziana*, Lowe, *Cyclas Lusitanica*, n. sp. The fauna of Portugal now includes 151 extra-marine Mollusca. The peculiar species are rather few, but the fauna is of interest as showing which species extend to the extreme west of the European continent.

PETTARD.—Notice sur les Coquilles terrestres de Tasmanie (The land shells of Tasmania), pp. 261—263.

A short but interesting note. Tasmania is much richer in proportion than Australia in land shells. 2 species of *Bulimus*; 3 of *Succinea*, 2 of *Truncatella*, 3 of *Vitrina*, and 122 of *Helix* are already known. Only 3 species (*II. Alexandriæ*, *Mortii* and *Sydneyensis*) are common to Australia, and from their habitats—gardens, cellars, sewers, etc.—have probably been introduced either into Australia or Tasmania. In Tasmania itself the species are very localised, only two being common to the North and South. Hence further discoveries may be confidently anticipated.

FISCHER.—Note sur les dents intérieures de la coquille de l'*Helix polygyrata*, Born. (The internal teeth of *H. polygyrata*), pp. 263—267.

Adult shells have a row of 5 teeth (two parietal and three palatal), inside the last whorl at 40 to 80 millimetres from the aperture, and, sometimes, 40 to 50 millimetres beyond, traces of a second row. Young shells bear traces of three rows, the

oldest (in the seventh whorl) scarcely perceptible, the intermediate well marked, and the most recent rather indistinct, but clearer than the first row. It is evident that the older rows are gradually absorbed.

MÖRCH.—Notice supplémentaire sur les *Fuseaux Arctiques* (Supplementary note on the Arctic *Fusi*), pp. 267—271.

The epidermis of *Buccinum* and *Fusus* is very variable, and not to be relied on for specific characters. Looking from above a *Siphonorbis* has the appearance of a *Planorbis*, a *Sipho* of a bladder. *Fusus Islandicus*, Lovén = *F. Berniciensis*; *F. Islandicus*, Gould = *F. Stimpsoni*, Mörch = *F. curtus* Jeff.; *F. despectus*, Linn.; the form found fossil at Uddevalla must be considered the type. *F. breviculus*, Desh., comes from Kamtschatka.

CROSSE and FISCHER.—Diagnoses Molluscorum novorum, Guatemala et reipublica Mexicanae incolarum (New Guatemalan and Mexican Mollusca), pp. 271—273.

Spiraxis Blandi, Vera Cruz; *S. Guatemalensis*; *Subulina Sargi*, Coban; *Opeas gladiolus*, Guatemala; *Cæcilianella Vera-cruzensis*; *Succinea Pueblensis*.

SOUVERBIE.—Note complémentaire sur le *Scalenostoma apiculatum*, p. 274.

A slight correction.

PAULUCCI.—Note sur l'identité du *Conus spiroglossus*, Deshayes, avec le *C. generalis*, Linné. (The identity of *C. spiroglossus* and *generalis*.)

C. spiroglossus was described and figured in the "Conchyliologie de l'île de la Réunion." From an extensive suite of specimens in her collection the Marchesa Paulucci has ascertained that it is only the young of *generalis*.

Under Correspondence and News we find (1) a short note, by Dr. Jeffreys, showing that he had already corrected the mistake about *Ancylus Gussoni*; (2) that Mr. G. Nevill will shortly publish a work on the Mollusca collected by the late Dr. Stoliczka in Central Asia, and (3) that M. Crose has been named Officer of Public Instruction, a well-deserved honour, of which all our readers will be glad to hear.

C. P. G.

Rossmassler's Iconographie,

Fortgesetz von Dr. W. Kobelt.

Vol. V. (Vol. II. of continuation) Parts 1 to 3.

These new parts contain much of great interest. We have:—

1.—The subgenus *Levantina*—a fine group of Helices from Syria, Mesopotamia, etc. Two plates of these are given.

2.—The Italian species of *Iberus*—*Helix muralis*, *serpentina*, etc. Dr. Kobelt judiciously reduces the number of species in this puzzling group (2 plates).

3.—Various species of *Fruticicola*. The right hand fig. (1194) represents a very beautiful banded *H. fruticum*, and fig. 1197 the magnificent *H. inchoata*; (fig. 1201) is the true *H. cantiana*, though a very small specimen, but we have our doubts as to the Belgian example (fig. 1202.) None of the Kentish specimens have a banded periphery. (4 plates).

4.—Several species of *Limnea* (3 plates).

5.—*Leucochroa* (1 plate). From Mr. Binney's researches we regard *Leucochroa* as a subgenus of *Helix* near *Eremophila*.

6.—*Xerophila* (2 plates) including some large forms of *H. variabilis* (figs. 1295—1300).

7.—*Glandina* and *Parmacella* (1 plate.) The animal of *G. algira* is figured (1316.) We are inclined to think that there is more than one European species of *Glandina*. The figures of *G. algira* are too green.

1.—*Buliminus* (1 plate) including the enormous *B. labrosus*.

Our readers will see how rich and varied a conchological banquet is spread before them in this treble part. C. P. G.

SUGGESTIONS FOR FINDING THE SMALLER LAND SHELLS.

By HENRY LAVER, F.L.S.

I have adopted for some time, very successfully, the following plan of taking the smaller snails, and, believing that it might be useful to others, I beg to forward it to you for publication in the Journal. My procedure is to take a bag to those parts of the wood most likely to abound in snail life, and to collect the dead leaves, grass, and other rubbish until my bag is full. This I carry home and sift through a common cinder-sieve; the broken rubbish that passes through I then sift again over a cloth—an empty sack will do very well—in a brisk wind, in fact I winnow the light rubbish away, and then search over the remaining débris in a good light, and by this means have found many smalls I did not think occurred in this district at all. The advantage of winnowing is that you have a very small quantity of rubbish to search, and I believe but few of the snails have been lost, in addition to which this form of small-hunting will occupy but little time in the wood—an important matter to many, myself included—and I can, therefore, recommend it, and should any of your readers adopt it, perhaps they will give us their experience.

HELIX LAMELLATA, JEFFREYS.

By RICHARD RIMMER.

When on a visit in Kirkcudbrightshire last August, I found this species plentifully upon fallen and decayed leaves of the holly in woods.

Dr. Gwyn Jeffreys has already described the animal at p. 158, vol. 4 of "British Conchology," but a few additional particulars respecting it may perhaps be of interest to your readers, the more so as several of the specimens I collected are still alive, and afford me daily opportunities of observing their habits.

A large proportion of the specimens found in the above-named locality were subject to erosion of the epidermis, especially near the apex.

ANIMAL.—*Head* and *body* yellowish-white; *back*, slaty-grey, with a yellowish-white line running down the middle; *tentacles*, upper pair clavate and long for the size of the animal, of a dark bluish colour, bulbs inky black, globular; *lower pair* much lighter in colour, tips whitish; *foot* whitish, rather narrow, tapering to a fine but slightly obtuse point behind.

The animal is very timid, and shrinks from exposure to sunshinc, or even ordinary daylight. When crawling its movement is unusually rapid for a snail, and it carries its shell in an upright position, swaying it from side to side as it advances, reminding one of the waddling of a duck.

When desirous of observing it under the microscope I found that the only way to induce it to leave its shell was to place it on a damp leaf, and allow a strong ray of sunlight to rest upon it, when it would soon emerge and start off in quest of shelter.

I have, as yet, been unable to detect this little creature in the act of feeding, which is, probably, for the most part performed at night. That its food principally consists of decayed holly

leaves is most likely, as among them it usually seeks its home. It is possible, however, that it may sometimes change its diet, for several of my specimens frequently leave their moist holly leaves and nestle among the roots of a piece of *Jungermannia platyphylla*, which I have given them. I do not think my pretty little friend is carnivorous, at all events, though he has been supplied with tempting morsels of flesh of various kinds, both cooked and raw, he seems to avoid them, and I can discover no signs, even with the microscope, of his having committed any ravages upon them.

HELIX PISANA, MULLER.

By RICHARD RIMMER.

In the 12th number of "The Quarterly Journal of Conchology" there is an interesting communication by Mr. Sheriff Tye, respecting *H. Pisana*, upon which I will venture to offer a few remarks.

In the summer of 1876 he observed this species in Vazon Bay, Guernsey, and not having met with any record of its existence in that island, very naturally concluded that he was the first to discover the fact of its being there. During the summer of 1873, however, I found it close to Vale Castle, near St. Sampsons. In making this statement I trust it will be distinctly understood that I have no intention or desire whatever to deprive a brother naturalist of the satisfaction which a *new find* is calculated to afford, my sole object being, if possible, to arrive at the truth, which, to my thinking, is of much more moment than any priority of claim to discovery.

Upon finding this species in a locality where, like Mr. Sheriff Tye, I believed it had hitherto been unobserved, I was on the

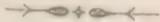
point of recording the fact, but, after a little deliberation, I resolved not to do so, as I felt convinced that it was not indigenous to, but had been introduced, and that very recently, into ~~Gwynne's Bay~~.

To this conclusion I was led (1) because *all* the specimens I found were *adults*—not a single individual with a mouth unfinished was to be seen, after several days of diligent searching, and (2) their habitat was so circumscribed, and their number so small—not exceeding, probably, a few hundreds—that I was driven to the conclusion that they could not possibly have existed there for any great length of time. The position of the spot, too, was remarkable, inasmuch as it had a *north-eastern aspect*.

In "British Conchology," vol. i, p. 208, Dr. Gwyn Jeffreys observes that "the limited range of this species in Great Britain is remarkable," and adds that two attempts he made to colonize it on the sand hills near Swansea proved altogether unsuccessful. Now, in the autumn of 1874, being in that neighbourhood, I visited the spot for the express purpose of discovering, if possible, some trace at least of Dr. Gwyn Jeffreys' industry, and, to my astonishment, and to his also—for I immediately informed him of the fact—I found the shell in countless numbers, of all ages, the variety *alba* having apparently the superiority as to numbers. From these facts we may infer that *Pisana* is, under favourable circumstances, capable of colonization, that the immigrants, from ~~some~~ cause (the sudden change, perhaps, injuriously affecting their delicate constitution) do not long survive, but leave behind them a progeny which, being born there, take more kindly to the place. This may, in some measure, explain how it was that Mr. S. Tye found all the young specimens in Vazon Bay feeding in the open, while the old ones (which were probably sickly) had gone for shelter to the brick wall.

The colony I discovered at St. Sampson's has, in all likelihood, perished, together with its offspring (if it had any), in consequence of the inappropriate aspect selected by its founder, who, if I am not greatly in error, discovered his mistake, and afterwards repeated his experiment in Vazon Bay with better success. I can hardly think this species existed in 1873 in Vazon Bay, or, indeed, anywhere else in Guernsey except near St. Sampson's, as I made a very close and diligent search over the whole island, for which I had ample opportunity during a residence there of several months, my whole time being devoted to that object; nor is it at all likely that this very conspicuous species could have been overlooked by so observant a naturalist as the late Dr. Lukis, had it been in Guernsey in his day.

I may add that, though I cannot actually recall the circumstance to mind, it is very likely I showed some of the St. Sampson's shells to Mr. W. Randall, whom I frequently met in my rambles.



LIST OF LAND SHELLS COLLECTED ON FITZROY ISLAND: WITH NOTES ON THEIR GEOGRAPHICAL RANGE.

By JOHN BRAZIER, C.M.Z.S.,

Member of the Royal and Linnean Societies of New South Wales,
Corresponding Member of the Royal Society of Tasmania.

Fitzroy is a small granitic island on the North-East Coast of Australia, near Cape Grafton, and about one mile off the mainland: it is nearly two miles long North-East and South-West, and two-thirds of a mile broad; it rises to a peak 860 feet above the level of the sea, and is well wooded right to its summit. Among the most luxuriant tropical growths, which are of great frequency, the familiar Eucalypti rear their not always graceless stems. One's progress is very much impeded in the valleys by prodigious climbers with stems 200 to 300 yards long (*Calamus Australis*).

In June, 1848, when the island was visited by my friend Mr. John Macgillivray, in H.M.S. Rattlesnake, he only records two species *Bulimus Tuckeri* and *Pupina Thomsoni*.

When I visited the island in December, 1871, with the Australian Eclipse Expedition, I obtained at or near the watering place on the west side of the island 7 species of *Helix*, 1 *Helicarion*, 2 of *Pupa*, 1 *Diplomatina*, 1 *Leptopoma*, 2 of *Bulimus* (including *Tuckeri*), 1 *Ditropis*, 1 *Georissa* (these two are forms quite new to Australia), and 1 *Truncatella*. I now add 3 species of *Melampus*, 1 of *Pythia* and 1 of *Cassidula*, which I collected in one day, during my second visit on June 6th, 1875, though only on the island for a few hours. I also obtained another species of *Helix*, making, with the Land and Amphibious species, the total of 24. They are as follows:—

1. ***Helix Macgillivrayi***, *Forbes*, Voyage of H.M.S. Rattlesnake, vol. ii, p. 377, plate 3, fig. 1.

Found on the trunks and limbs of trees in the valleys, at an elevation of 456 feet above sea level.

The type specimens were found by Mr. Macgillivray on the Frankland Islands, some three miles south of Fitzroy. Only a few months back my friend Mr. C. E. Beddome obtained specimens on the mainland, 28 miles inland from Cardwell, Rockingham Bay, at an altitude of 3,500 feet.

2. ***Helix Franklandiensis***, *Forbes*, Voyage of H.M.S. Rattlesnake, vol. ii., p. 372, plate ii, fig. 2 a.b.

Found under decayed wood at the roots of trees in the valleys, at 300 feet.

Also collected by Mr. Macgillivray, at the Frankland Islands. Cardwell, Rockingham Bay, in the bushes under leaves (Mr. C. E. Beddome).

3. *Helix Aridorum*, Cox, Proc. Zool. Society, 1867, p. 924.

Found on the flat near the watering place, under coral and decayed wood.

This is the same species found by Mr. Macgillivray at the Frankland Islands and quoted by the late Professor Forbes as *Helix similaris*, Fér. I have seen some of the original specimens from the Franklands, and have compared them with what I collected at Fitzroy, under the lens. They are all finely granulated, characters not to be found in *Helix similaris*, Fér. *Helix aridorum* is also found at the Clarence River, New South Wales, Brisbane and Burnett River, Queensland. The only locality in any part of Australia where *H. similaris*, Fér., is found is in Guilfoyle's Nursery Double Bay and Elizabeth Bay, near Sydney, New South Wales. They were introduced with plants from the Mauritius. After rain I have found them in vast numbers, crawling on the trunks of fruit trees and on the ground under Samphire and Dianthus. It is quite improbable that *Helix similaris* has ever been carried on floating timber to Australia.

4. *Helix Elleryi*, Brazier, Proc. Zool. Society, 1874, p. 668, plate lxxxiii, figs. 3-4.

Found under decayed leaves, near the watering place.

A small, conical, very thin, pale brown shell, having the periphery sharply keeled and spirally striated.

It is also found on the Barnard Islands No. III, North East Australia, under drift coral, thrown up, one time or another, during some terrific gale.

5. **Helix Russelli**, *Brazier*, Proc. Zool. Society, 1874, p. 668, plate 13-14.

Found near the watering place, under leaves at the roots of trees.

A small, turbinately globose, thin, shining, horny, brown shell, with elevated spire.

On my way to New Guinea, in 1875, I found it on Barnard Islands No. III; Home Islands, off Cape Grenville, North-East Australia; Cape York, North Australia; Bet and Darnley Islands, Torres Straits; Cardwell, Rockingham Bay (Mr. C. E. Beddome).

6. **Helix turruculata**, *Cox*, Proc. Zool. Soc., 1867, p. 724.

Found with *Helix Elleryi* and *Russelli*.

It does not differ from the type specimens from Port Curtis.

Also Barnard Islands No. III.

7. **Helix pampina**, *Cox*, Monog. Aust. Land Shells, 1868, p. 3, plate xix, fig. 9.

Found on the leaves and trunks of trees, at an elevation of 456 feet above sea level. I include this as I obtained it during my second visit of a few hours, in 1875, to the island, on my way to New Guinea.

I also obtained specimens at the Great Palm and Barnard Islands No. III, North-East Australia; Albany Island and Cape York, North Australia. The typical specimen in my collection was obtained at Wide Bay, Queensland, Bowen, Port Denison (Mr. A. Simson).

8. ***Helix rustica***, Pfr., Zeitschr. f. Malak., 1852, p. 112.

= *H. inconspicua*, Forbes.

= *H. impexa*, Reeve.

Found under decayed wood and leaves, at the roots of trees, near the watering place.

9. ***Bulimus Tuckeri***, Pfr., Proc. Zool. Society, 1846, p. 30.

= *B. Walli*, Cox.

Found in crevices of coral, at the roots of trees.

Also on Barnard and Home Islands, North-East Australia; Albany Island and Cape York, North Australia; Sue, Warrior, Bet, Long, Dungeness, and Cocoanut Islands, Torres Straits. These last localities I visited in 1875. Sunday, Lizard, and Sir Charles Hardy's Islands (Macgillivray). All these islands are inside the great Australian coral barrier.

10. ***Bulimus pacificus***, Pfr., Mon. Helic. Viv., 1859, Vol. iii, p. 414.

= *Pupa pacifica*, Pfr., Proc. Zool. Society, 1846, p. 31.

Found with *B. Tuckeri*, and at the whole of the above islands.

11. ***Helicarion Brazieri***, Cox, Proc. Zool. Society, 1873, p. 151.

Found at an altitude of 456 feet above sea level, crawling on the trunks of trees and on large granite boulders, in the dark and thickly wooded virgin forest.

12. ***Vertigo Macdonnelii***, Brazier, Proc. Zool. Society, 1874, p. 669, pl. lxxxiii, figs. 22-23.

Found under leaves and at the roots of trees.

Also No. 8 Island, Claremont Group, off Cape Sidmouth, Barnard Islands No. III, North-East Australia; Cape York, North Australia.

13. **Vertigo Scotti**, *Brazier*, Proc. Zool. Society, 1874, p. 669, pl. lxxxiii, figs. 24—26.

Only one specimen found at the watering place, under a bit of wood.

14. **Diplommatina Gowlandi**, *Brazier*, Proc. Zool. Society, 1874, p. 670, pl. lxxxiii, figs. 19—21.

Found at the roots of trees, crawling upon the grass during a heavy rain. On my second visit to the island, in 1875, I only obtained 3 specimens, no rain having fallen for some months. Everything appeared to have been burnt up with the warm weather.

15. **Cyclophorus (Ditropis) Whitei**, *Brazier*, Proc. Zool. Society, 1874, p. 669, pl. lxxxiii, figs. 5—7.

Found under wood near the watering place.

Barnard Islands No. III, North-East Australia; found under coral at the edge of the brushes.

16. **Leptopoma vitreum**, *Lesson*, Voy. de la Coq., p. 346, pl. 13, fig. 6.

= *Dermatoxera vitrea*, H. & A. Adams.

Found on the leaves and trunks of trees and small bushes, at the altitude of 456 feet.

Also found at the whole of the Solomon Islands, New Britain and New Ireland. They are brought off by the natives in small-sized baskets, three or four quarts in each. The Rev. George Brown, on his return from New Britain

and New Ireland, brought with him to Sydney some bushels of them. Dunk, Frankland, and Green Islands, North-East Australia (Macgillivray).

17. **Pupina Thomsoni**, *Forbes*, Voy. H.M.S. Rattlesnake, App., p. 381, pl. iii, fig. 2.

Found at the roots of trees in shaded places. Living specimens are only to be procured during rain; in the dry season one has to scrape and dig in the loose coral that forms the high flat before one can get perfect and dead specimens.

18. **Georissa multilirata**, *Brisson*, Proc. Zool. Society, 1874, p. 670, pl. lxxxiii, figs. 8—10.

Found crawling on the roots of grass during a heavy rain.

19. **Truncatella teres**, *Pfr.*, Proc. Zool. Society, 1856, p. 336.

Found under wood at the watering place, and near the coral sand beach, under drift timber and weeds.

Also found on Barrow Island and Cape Grenville, North-East Australia.

20. **Melampus pulchellus**, *Petit*, Proc. Zool. Society, 1842, p. 202.

= *Auricula pulchella*, Petit.

One specimen found up the valley at the watering place.

21. **Melampus trifasciatus**, *Kuster*, *Auricula*, p. 38, pl. v, figs. 15—17.

One specimen found at the watering place.

22. **Melampus parvulus**, *Nuttall* in *Pfr. Mon. Auricula*, 1856, p. 24.

One specimen found at the watering place.

The aperture is lighter in colour than in the specimens from Oahu, Sandwich Islands.

23. *Pythia Argenvillei*, *Pflz., Zeitschr. f. Malak.*, 1853, p. 191.

Found in vast numbers in shaded places up the valley, near the watering place, under decayed wood and leaves.

24. *Cassidula angulifera*, *Pflz. (Auricula)*, in *Revue Zool.*, 1841, p. 101.

= *Auricula subrepta*, Homb et Jaq.

= *Auricula angulata*, Forbes.

= *Melampus anguliferus*, Chenu.

= *Rhodostoma bidentata*, Swainson, Proc. Royal Soc. Tasmania, 1854, vol. iii, p. 45, pl. vii, fig. 4.

One specimen found near the brackish water.

I have also found it on the mainland at Cardwell, Cape Sidmouth, North-East Australia; Mud Bay, Cape York, North Australia; and Katow, South New Guinea.

It was described by Swainson as *Rhodostoma bidentata*, and appears to have been overlooked by authors.



TEN DAYS' DREDGING AT OBAN.

By the Rev. A. M. NORMAN, M.A.

A line of railway has been now opened to Dalmally, and Oban has thus been brought within very easy reach of the tourist visiting Scotland. This deservedly favourite place, on the western coast, is likely each year to become more frequented. It has struck me, therefore, that a list of the Mollusca which, during a very short visit, were observed in the land-locked waters close to Oban, might not be without interest to your readers.

In August last I went to Oban for the purpose of examining the fauna of the Bay more minutely than I had previously had opportunity of doing when merely staying there for a night or so in years gone by, on my way to dredging grounds further to the north.

It is necessary that I should mention that during my recent visit my attention was chiefly directed to the Polyzoa, Crustacea, Hydrozoa and Sponges.* The Mollusca were regarded by me as of secondary moment, as I was not likely to find, in such a locality, anything that was new to me; and, although the larger species which could be seen with the unassisted eye in the sieves while at sea were carefully picked out, the finer sand and mud were not saved for home examination. Had my aim been merely the procuring of shells, the following list would no doubt have been considerably extended as regards the smaller species (*Rissoa*, *Ostomia*, &c.); although the locality does not seem so favourable for minute as it is for the larger Mollusca.

The boat employed was a small row-boat with two oars. The depth dredged never exceeded 16-20 fathoms; and the area examined was purposely very restricted. It only embraced Oban Bay, lying to the north of a line drawn from Oban to Kerrera, and thence to the "Maiden Isle," and perhaps three-quarters of a mile round the point on which Dunolly Castle stands. Kerrera Sound to the south of Oban, Loch Linnhe outside of the Island of Kerrera, and Loch Etive were left wholly unexplored.

Taking these circumstances into consideration, the conchologist who casts his eye down the following list will be in a position to understand—first, that the Molluscan fauna of the Bay

* I hope before long to publish elsewhere some notes with respect to the animals of these classes which were procured. Many species new to our fauna or to science were obtained.

of Oban is very rich; secondly, that interest attaches to the Oban fauna, as, indeed, to that of the Hebrides generally, on account of the intermixture of northern and southern forms.

- Terebratula caput-serpentis, (*Lin.*)
- Crania anomala, (*Müller*).
- Anomia ephippium, *Lin.*
- ", striata, *Lovén*.
- Ostrea edulis, *Lin.*
- Pecten pusio, (*Lin.*)
 - ", opercularis, (*Lin.*)
 - ", tigrinus, (*Müll.*)
 - ", striatus, (*Müll.*)
 - ", niveus, *Macgill.*
 - ", similis, *Laskey*.
 - ", maximus, (*Lin.*)
- Lima elliptica, *Jeff.*
- ", Loscombi, *Sow.*
- ", hians, (*Gmelin*).
- Mytilus edulis, *Lin.*
 - ", modiolus, *Lin.*
 - ", phaseolinus, (*Phil.*)
- Modiolaria marmorata, (*Forbes*).
 - ", discors, (*Lin.*)
 - ", nigra, (*Gray*).
- Nucula nucleus, (*Lin.*)
- Leda minuta, (*Müll.*)
- Pectunculus glycimeris, (*Lin.*)
- Arca tetragona, *Poli*.
- Lucina spinifera, (*Mont.*)
 - ", borealis, (*Lin.*)
 - ", flexuosus, (*Mont.*)
- Cardium edule, *Lin.*
 - ", fasciatum, *Mont.*
 - ", nodosum, *Turton*.
- Cyprina Islandica, (*Lin.*)
- Astarte sulcata, (*Da Costa*).
 - ", elliptica, (*Brown*).
- Circe minima, (*Mont.*)
- Venus lincta, *Pulteney*.
 - ", fasciata, (*Da Costa*).
 - ", casina, *Lin.*
 - ", ovata, *Penn.*

- Venus gallina*, *Lin.*
Tapes virginicus, (*Lin.*)
 " *pullastra*, (*Mont.*)
Lucinopsis undata, (*Penn.*)
Tellina crassa, *Penn.*
 " *fabula*, *Gronov.*
Psammobia tellinella, *Lamk.*
 " *Ferröensis*, (*Chemn.*)
Macra elliptica, *Brown.*
Syndesmia nitida, (*Mill.*)
 " *alba*, (*Wood.*)
Scrobicularia piperata, (*Lin.*)
Solen pellucidus, *Penn.*
 " *ensis*, *Lin.*
Pandora obtusa, *Leach.*
Lyonsia Norvegica, (*Chemn.*)
Cochlodesma prætenue, (*Pult.*)
Thracia villosiuscula, (*Macgil.*)
Corbula gibba, (*Oliv.*)
Mya truncata, *Lin.*
Sphaenia Binghami, (*Turton.*)
Saxicava rugosa, (*Lin.*)
 " var. *arctica*, (*Lin.*)
Dentalium entalis, *Lin.*
Chiton fascicularis, *Lin.*
 " *cinereus*, *Lin.*
 " *marginatus*, *Penn.*
 " *ruber*, *Lin.*
 " *laevis*, *Penn.*
 " *marmoreus*, *Fab.*
Patella vulgata, *Lin.*
Helcion pellucidum, (*Lin.*)
Tectura testudinalis, (*Müll.*)
 " *virginica*, (*Müll.*)
Pilidium fulvum, (*Müll.*)
Emarginula fissura, (*Lin.*)
Fissurella Graeca, (*Lin.*)
Trochus Greenlandicus, *Chemn.*
 " *magus*, *Lin.*
 " *tumidus*, *Mont.*
 " *cinerarius*, *Lin.*
 " *umbilicatus*, *Mont.*
 " *Montacuti*, *W. Wood.*
 " *zizyphinus*, *Lin.*

- Trochus millegranus, *Phil.*
Lacuna divaricata, (*Fabr.*)
Littorina obtusata, (*Lin.*)
 " *rudis*, (*Maton.*)
 " " *var. tenebrosa*, (*Mont.*)
 " *littorea*, (*Lin.*)
Rissoa parva, (*Da Costa*)
 " *inconspicua*, *Alder*.
 " *membranacea*, (*Adams*).
 " *striata*, (*Adams*).
Hydrobia ulvae, (*Penn.*)
Turritella terebra, (*Lin.*)
Odostomia conoidea, (*Brocchi*).
 " *unidentata*, *Mont.*
Velutina laevigata, *Penn.*
Trichotropis borealis, *Brod. & Sow.*
Aporrhais pes-pellicani, (*Lin.*)
Purpura lapillus, (*Lin.*)
Buccinum undatum, *Lin.*
Murex crinaceus, *Lin.*
Trophon Barvicensis, (*Johnst.*)
 " *truncatus*, (*Ström.*)
Fusus antiquus, (*Lin.*)
Nassa incrassata, (*Ström.*)
Defrancia linearis, (*Mont.*)
Pleurotoma striolata, *Phil.*
 " *septangularis*, (*Mont.*)
 " *ruia*, (*Mont.*)
 " *turricula*, (*Mont.*)
Cypraea Europaea, *Mont.*

Only a very few Nudibranchiata were observed, and those were common species.

The following Mollusca, though not obtained during my last visit, are also to be found in the neighbourhood of Oban. Many of them have been previously dredged by myself in Loch Linnhe, and the rest have been recorded on reliable authority—found by Jeffreys, Barlee, Bedford, &c. :—

Pecten Testae, *Bivona*; *Nucula sulcata*, *Brown*, and *N. nitida*, *G. B. Sow*; *Kellia suborbicularis*, (*Mont.*); *Lepton squa-*

mosum, (*Mont.*) ; *Isocardia cor*, (*Lin.*) ; *Neara cuspidata*, (*Oliv.*) ; *Chiton Hanleyi*, *Bian* ; *Propilidium aleyrode*, (*Ferr.*) ; *Emarginula crassa*, *G. Sow.* ; *Cyclostrema nitens*, (*Phil.*), and *C. serpuloides*, (*Mont.*) ; *Trochus helicinus*, *Fab.* ; *Phasianella pulla*, (*Lin.*) ; *Rissoa reticulata*, (*Mont.*), *R. violacea*, *Desm.*, *R. vitrea*, (*Mont.*), and *R. semistriata*, (*Mont.*) ; *Odostomia Lukisi*, *Jeff.*, *O. umbilicaris*, (*Malm.*), *O. insculpta*, (*Mont.*), and *O. decussata*, (*Mont.*) ; *Chemnitia fuliginea*, (*Thompson*) ; *Bulinella affinis*, *F. & H.* ; *Natica Montagui*, *Forbes* ; *Cerithiopsis tubercularis*, (*Mont.*) ; *Pleurotoma attenuata* (*Mont.*), and *P. brachystoma*, *Phil.* Of course the list is capable of considerable extension as regards the commoner forms.

DESCRIPTIONS OF NEW SPECIES OF LAND SHELLS FROM THE EAST COAST OF AFRICA.

By JOHN W. TAYLOR.

I have pleasure in resuming the description and publication of the various and interesting species collected by Mr. Gibbons in East Africa.

Buliminus Gibbonsi (Pl. III, fig. 1).

Shell, broadly ovate-conical, thin, glistening, hardly semi-transparent, of a light horn color, strongly and very regularly striate in the line of growth ; *epidermis* distinct, moderate ; *whorls* $6\frac{1}{2}$ -7 broad, ventricose ; the *body-whorl* very large ; the *apex* blunt ; *suture* distinct ; *aperture* ovate ; *outer lip* thin, simple ; *inner lip* reflected partly over the umbilicus ; anterior end of mouth rounded ; *umbilicus* large and deep.
Length 0.625, breadth 0.375.

Hab. Mozambique.

Two specimens only of this fine species were obtained on the mainland, Mozambique. One of the specimens, found beneath a stone, was evidently only recently dead.



1. *BULIMINUS GIBBONSI.*

3. *OPEAS DELICATA.*

5. *SUBULINA INTERMEDIA.*

2. *B. COSTATUS.*

4. *BULIMINUS CINEREUS.*



Buliminus costatus, Gibbons, MS. (Pl. III., fig 2).

SHELL, slender, elongately-conical, thin, of a light opaque brownish color, with distinct, transverse, and slightly oblique ribs; the whorls are lighter colored than the rest of the shell; epidermis thin; whorls 6-6½ tumid, flattened, and inflected towards suture, producing a somewhat turritate aspect, gradually increasing in size, the last whorl forming about one-third the length of the shell; suture broad and deep; mouth narrow, ovato-elliptical, somewhat contracted and pointed in front; outer lip thin and direct, long and gently curved; inner lip short and straight; columella slightly twisted; aperture white within and strengthened by a slight internal thickening; umbilicus obsolete.

Length 0.156, breadth 0.062.

Hab. Zanzibar.

Only two dead specimens of this pretty species were found, among dead leaves under trees at Zanzibar.

Opeas delicata, Gibbons, MS. (Pl. III., fig. 3).

ANIMAL yellowish.

SHELL conico-turritate, elongate, very thin, semi-transparent, glossy, of a pearly gray color, clouded and rather opaque in places, finely but very distinctly striulate transversely, the striulae rather curved, with the convexity towards the aperture; epidermis very thin; whorls 7-8, rather tumid, rapidly enlarging, especially after the 4th or 5th whorl, the last being much the largest and most tumid; apex rather obtuse; suture deep and distinct; mouth rather narrow, ovate, somewhat oblong, lips almost parallel, outer thin and sinuous, inner very slightly reflected behind anterior end of aperture, rounded; umbilicus narrow but rather deep.

Length 0.275, breadth 0.093.

Hab. Zanzibar.

Rather diffused around Zanzibar, but not common : usually under stones. A number were found by Mr. Gibbons in the interstices of a small piece of coral, lying on the ground under a tree ; a few yards away great quantities of dead and old shells were lying among the grass, near some bushes.

In March this species contains 3 or 4 large calcareous shelled eggs.

Buliminus cinereus, Gibbons, MS. (Pl. III., fig. 5).

SHELL conical, tapering, rather thin, of a light brown color, faintly striulate transversely ; epidermis thin and distinct ; whorls $7\frac{1}{2}$, convex, inflected towards suture, gradually enlarging to last, which is rounded and one-third the length of the shell, spire produced, tapering ; apex rather acute ; suture deep and very distinct ; mouth ovo-trigonal, slightly pointed in front, subangulate behind ; peristome thin and direct ; inner lip slightly reflected ; umbilicus distinct, moderately deep.

Length 0.25, breadth 0.105.

Hab. Zanzibar.

One dead specimen of this species was found at Zanzibar.

Subulina intermedia, Gibbons, MS. (Pl. III., fig. 4).

ANIMAL with body less than one-half the length of the shell, narrow and high, dorsum rounded ; tail sloping and abruptly pointed ; color a pearly white ; upper tentacles very short and also white, tipped with faint brownish ; lower almost obsolete.

SHELL elongated, very slender, conico-cylindrical, very thin, glossy semi-transparent, of a glairy straw color, very finely striolate in the line of growth ; epidermis very thin ; whorls $8-8\frac{1}{2}$, very oblique, convex, gradually tapering to apex, which is obtuse and abrupt ; the last whorl is but little larger than the penultimate ; suture very oblique, deep ; mouth broadly ovate ; outer lip thin

and curved; *columella* truncate, with a thin and somewhat indistinct layer of callus; *umbilicus* obsolete.

Length 0.375, breadth 0.076.

Hab. Zanzibar.

Rather numerous at Zanzibar, but in one place only, viz., under a bush in or on the light mould.

The animal crawls very slowly and by jerks, dragging the shell after it; the position of the shell would appear to be a matter of little moment to the animal; sometimes it is pulled along sideways, and on one occasion Mr. Gibbons observed a specimen actually pushing its shell before it. The tail is usually slightly curved upwards.

REMARKS ON THE GEOGRAPHICAL DISTRIBUTION OF THE TERRESTRIAL MOLLUSCA.

By C. P. GLOVNE.

I. INTRODUCTORY.—We have been induced to put together the following remarks on the geographical distribution of the terrestrial mollusca by the consideration that no general survey of the subject has been published in England of a later date than that in Woodward's "Manual of Recent and Fossil Shells," of which the first edition was published nearly a quarter of a century ago, and the second in 1866. The account of the subject in the first edition was very good for the time, that in the second was partially, but only partially, revised, and the third edition was a mere reprint of the second.

Of late years the discoveries of new species in regions little known in Woodward's time have been very numerous, and, besides this, the general classification of the terrestrial mollusca has been completely altered, so that, for example, the West Indies, to which

27 species of *Achatina* are attributed by Woodward, are not now considered to possess one; not on account of errors in localities, but because all the species are referred to other genera—the genus *Achatina* being now restricted to the large phytophagous African species, e.g., *A. fulica*. The additions that have been made to our knowledge of the particular regions will be stated more particularly under each. It may, however, be well to say generally that whilst the additions to the faunas of Europe, North Africa, and Asia Minor, of Tropical Africa, of Philippines, of the United States, and, to a less extent, of South America, have, though considerable, not been such as to materially modify general conclusions, the contrary is the case with regard to India, many of the Polynesian Islands (including New Caledonia), Australia, and Mexico.

We adopt, generally, the great divisions of Dr. Sclater, subdividing them into regions of smaller extent, and we would make the general remark that whilst on continents a vast extent of land is sometimes comprised in a single region, very small islands must often be separately treated.

With regard to the boundaries of regions there is one misconception as to which we must warn our readers, that of thinking that they are sharply defined. This is only true with regard to some islands, and even with them there are often cases in which the fauna has in some way overstepped a narrow strait and spread to the neighbouring mainland, as in the case of Florida, which has received a large immigration of West Indian species. On continents a sharp boundary is very rare, and the rule is for one fauna gradually to give way to another, as there are seldom natural obstacles forming perfect barriers; even in the case of the Tropical African Province, perhaps the best defined of any, Abyssinia is a sort of border land in which such purely African groups as *Limicolaria* and *Pella* are found together with

Terebratula, *Pitula* and a whole series of *Pupa* of European facies. In short, these boundaries are not like those made by treaty, whether at Vienna or Frankfort, but what they lose in definiteness they gain in permanency, for whereas the political map of Europe fifty years ago would now be pretty antiquated, and that of a century back useless, it would require many centuries, or rather hundreds of centuries, before there was any perceptible change in the conchological map of the same region.

The following are the Provinces defined by Dr. Sclater, and now generally admitted.

- 1, THE PALEARCTIC PROVINCE; 2, THE ETHIOPIAN PROVINCE;
- 3, THE PALEOTROPICAL PROVINCE; 4, THE AUSTRALASIAN PROVINCE; 5, THE NEARCTIC PROVINCE; 6, THE NEOTROPICAL PROVINCE.

II. The Palæarctic Province.—We include under this Province, with reference to the Mollusca, all Europe, Africa north of the Sahara, the Atlantic Islands (the Azores, the Madeira Archipelago, the Canaries and Cape de Verdes), Asia north of the line of deserts, and, also, Arctic America, but we exclude Japan—contrary to Mr. Wallace's views in his excellent work on the Geographical Distribution of Animals—as the genera *Cyclophoroides*, *Alyceus*, *Pupina* and *Helicina* are undoubtedly tropical, and the Japanese *Clausiliae* are related to the tropical forms of Burmah, Siam, etc., and not to the European species. With regard to Arctic America we would refer to a very interesting article by Mr. Binney, "Catalogue of the Terrestrial Air-breathing Mollusks of North America," in the Bulletin of the Museum of Comparative Zoology, in which he gives a list of 33 species of the "Northern Region," of which 13 are also found in Europe. It is our opinion, from the similarity of the Siberian to the European fauna, that these species spread to America by way of Asia, across the narrow Behring's Straits rather than by Iceland and Greenland, and the

discovery of a species of *Clausilia* in Alaska (formerly Russian America) seems to confirm this view. A very complete catalogue of the species of this province (except the Atlantic Islands) is Dr. Kobelt's "Catalog der im Europäischen Faunengebiet lebenden *Bivalveconchylium*," and Rasmussen's Iconographie with Kobelt's continuation, will, when complete, give figures and descriptions of all the species of land and freshwater shells mentioned in the Catalogue.

There is no want of works on particular districts, this having been naturally the best explored province of all, especially in its northern parts.

For lists of the species found in the Atlantic Islands the following authors should be consulted: Morelet for the Azores, Paiva for Madeira, etc., Mousson for the Canaries, and Dohrn's papers for the Cape de Verdes.

We sub-divide this province as follows:—

1. *NORTHERN REGION.*
2. *MEDITERRANEAN REGION.*
 - A. Austro-Turkish Division.
 - B. Italian Division.
 - C. Hispano-Algerian Division.
3. *ATLANTIC REGION.*
 - A. Azores.
 - B. Madeiran Archipelago.
 - C. Canaries.
 - D. Cape de Verdes.

1. *THE NORTHERN REGION.*—This region, which we consider as embracing the whole of Europe to the north of the Mediterranean basin, Siberia, and Arctic America, and, probably, from the list of species found near Kieff, published by M. Jelski in the

Journal de Conchyliologie for 1873, also the northern shores of the Black Sea, is poor in comparison with most of the others. The characteristic group is *Fruticicola*, the subgenus of *Helix*, including *rufescens*, *hispida*, etc., and the small subgenera of *Helix*, *Acanthina* and *Vallonia* are also marked features. The other subgenera of *Helix* are poorly represented. *Xerophila* and *Euparypha* are found in the littoral districts, as is also the subgenus *Cochlicella* represented by *H. acuta*, Müller, the shell called *Bulimus acutus* by Jeffreys and Pfeiffer. (It may here be remarked that the Jamaican *H. acuta*, Lam. must change its name if *Cochlicella acuta* is to be finally considered as a *Helix*, we have seen *acutissima* used in Paetel's catalogue, but as that name was given to a very distinct variety, we prefer *H. Lamarckii*, Féér, for the species, the other *H. Lamarckii* being now universally included in *Nanina*). The genus *Hyalina* is pretty largely represented in this region. *Pupa* and *Vertigo* are also abundant, *Buliminus* has only a very few species, *Clausilia* seems to die out to the north and west from its centre of dispersion in the Balkan Peninsula, and throughout the greater portion of the region *Cyclostomus elegans* and one or two species of *Acme* form the sole representatives of the operculate Pulmonifera.

This region includes the greater part of Dr. Fischer's Western Region which he makes to extend all along the coast of the Atlantic from Ireland to Portugal. We can hardly agree with this division. It is based upon the occurrence of certain peculiar species. These, however, are mostly limited to peculiar localities, whilst those species such as *Helix pisana* and *variabilis* which are truly distinctive of the coast, as opposed to the inland, fauna are also found throughout all the coasts of the Mediterranean. The truth appears to be that these species are common to the coast of the whole province (except in the Arctic Regions), and, therefore, unless a littoral region is to be formed, embracing the whole extent of land within a league or two of the sea, hardly an advisable

plan, they cannot be considered as defining any particular geographical region, but are merely species limited to a particular station in the same way as rock or marsh-loving species.

In Amooria, according to Schrenck, 17 out of 25 species are European, showing the immense diffusion of this poor fauna.

Two districts on the southern boundaries of this region deserve special mention—the Pyrenees and the Alps. The Pyrenees possess many peculiar species, amongst which may be mentioned *Helix constricta*, *carascalensis* and *Rangiana*, *Pupa pyrenaearia*, *polyodon*, *Partioti* and *ringens* (indeed the subgenus *Torquilla* is largely Pyrenæan) and *Clausilia Pauli*. *Pomatias* is also abundant, and of many wide-spreading species there are special varieties. The Alps, forming as they do the dividing line between the Northern and Mediterranean regions, naturally partake of the fauna of both, but the more numerous and characteristic species are Mediterranean.

II. THE MEDITERRANEAN REGION.—This is the richest part of the Palæarctic Province, and may be considered to include not only the basin of the Mediterranean itself, but that of the Black Sea, except, probably, the northern shores and the whole of Asia to the south of Siberia, and the west of the Indian Province, except Arabia.

Though there are many features in common, we consider that there are certain types characteristic of the different divisions, not by their exclusive limitation but by their great development. We refer to *Clausilia* and *Buliminus* in the East, and *Macularia* and *Zeris* in the West, and we therefore divide the region as follows:

A, the Austro-Turkish Division, comprising the basin of the Danube, the Balkan Peninsula, Asia Minor and the Caucasus;

B, the Italian Division, including, in addition to Italy proper, the Italian Tyrol, and the Swiss Canton of Ticino; and

C, the Hispano-Algerian Division, forming the western and southern part of the region.

There are certain characters common to the whole region, and even certain species very widely distributed; these we will therefore consider first.

Leucochroua is almost exclusively Mediterranean, a few species only being found in the Atlantic Islands. *Gonostoma* is also almost a purely Mediterranean group. *Campylaea* is very abundant, especially in the mountains. Of the group *Pentateenia* a few species only are found north of the Alps, and even those are almost all Mediterranean also, and the great bulk of the group are exclusively so. For instance the common British shell, *Helix aspersa*, attains a much larger size in Italy than in England. It is very difficult to believe that so abundant a British species has been introduced, but judging from the reduced size of English specimens, England would, to say the least, not appear to possess the most favorable climate for this mollusc. The *Xerophila* are exclusively Mediterranean, except a few species, such as *H. pisana* and *variabilis*, which also extend along the coasts of the Northern Region, and a few from the Atlantic Islands.

The *Bulinini*, though extensively distributed in other parts of the Old World, yet in Europe are found almost exclusively south of the Alps. The only European *Stenogyra*—*decollata*—is Mediterranean, and in the genus *Pupa* the subgenera *Torquilla* and *Sphyradium* are almost peculiar to our region. Of the genus *Clausilia* we will speak more at length under the Divisions A and B. In the operculate shells, *Leonia* is exclusively Mediterranean, and the only species of *Cyclostomus* that extends to the north of the Alps is *C. elegans*.

A. The Austro-Turkish Division. We consider this Division, the richest of all in species, to be clearly marked by the immense abundance of *Bulimus* and *Clausilia*. With regard to the former genus, it may be well to mention for the information of those who have not access to foreign conchological literature, that

the genus *Bulimus*, in the modern acceptation of the term, is not found in Europe. The majority of the species (including the British *B. obscurus* and *montanus*) are referred to *Buliminus*, whilst a few (such as the British *B. acutus* mentioned above) are included in *Holsia*, subgenus *Xerophila*, section *Cochlicilla*, and *B. decipiens* is a *Stenogrya*. The subgenus *Zehrina* (19 species) is altogether Anatro-Turkiish, except *B. detritus*, which is also found over a great part of the rest of Europe. Of *Napensis* (24 species) 15 are found here only, *Petrenus* (16 species) is special to this Division, and 37 out of 43 species of *Chondrula* occur here. The *Baleo-Clausilia*, which form a connecting link between *Balea* and *Clausilia*, are all Transylvanian, and the curious genus *Zospeum* has 9 species from the caves of Carniola, a tenth species being from the Spanish Pyrenees.

The distribution of *Clausilia* is very interesting, and as we are now treating of its metropolis, the opportunity seems a good one to consider it generally. From the Balkan Peninsula and its neighbourhood, where it occurs in a profusion of subgeneric forms, the genus appears to have sent out a comparatively large colony to the Italian Peninsula and Sicily, between 40 and 50 species, chiefly of the subgenera *Misura*, *Marpea*, *Aegathylla* and *Dolima*. More to the west and north the numbers are very small; most of the northern species belong to the s.g. *Iphigenia*, e.g. *C. ventriosa*, *Rolphii*, *parvula*, *nigra*, *crucifera* and the remarkable Pyrenean *C. Pauli*. Three species are found in Madeira, and going further west and crossing the Atlantic, we find the peculiar s.g. *Nensis*, represented by one species in Porto Rico—*C. tridens*, and by several, *C. Blandiana*, *exarata*, etc., among the Andes of South America. Throughout the rest of the New World there are none except the one species from Alaska already mentioned. To the south of its metropolis, *Clausilia* is very poorly represented; two or three species have been found in Algeria, and two in the Abyssinian region—*C. sennarensis* and *dyscherata*; but to the

east it is quite different. Asia Minor, Syria, and the Caucasus are all rich in *Clausilia*, second only to the Balkan Peninsula, and indeed it is doubtful whether they be not equally rich, allowing for the smaller amount of exploration. The prevalent subgenera are somewhat different. In the Balkan Peninsula and Austria the most largely represented subgenera are *Alopia*, *Marpessa*, *Fusulus* (chiefly Austrian), *Igathylla*, *Medora* (chiefly from the archipelago), *Delima* and *Herilla* (Austrian), and *Papillifera*. In Asia the prevalent subgenera appear to be *Laciniaria* and *Idyla*. *Alinda* is pretty evenly distributed, and *Mentissa* is equally Asiatic and Crimean. Passing to the East, we find that several species have been discovered in Persia, by the Italian Expedition, and we may conclude that thence the genus has spread through Afghanistan to the Himalayas, where there are several species belonging to the exclusively Eastern subgenus *Phedusa*. In the plains of India proper and the detached mountains of the Indian Peninsula the genus seems to disappear, but strange to say one species has been found in Ceylon. To the eastward it spreads through the Khasia and Cachar Hills to the Indo-Malayan Peninsula, where many species remarkable for their size, beauty, and peculiar form have been discovered, as *C. ovata*, *bulbus* and *Philippiana*, near Moulmein, and the wonderful *C. Mouhoti* in Cambodia. China and Japan, though comparatively unexplored, have already yielded several species; the latter especially is remarkable for fine forms, including *C. Yokohamensis* and *C. Reiniana*, which perhaps surpass even the magnificent *C. Mouhoti*. To the East the genus appears to die out, though there are several species in Sumatra and Java. In Borneo there are two, in the Philippines and the Moluccas there are one each. Finally, the one Alaskan species must be mentioned.

We have been induced to make this digression in order to explain at one view the distribution of this interesting genus, and

will now return to the Austro-Turkish Division. In the genus *Helix* the section *Carthusiana* is principally found here, and *Campylaea*, though also tolerably abundant in Italy, has more representatives here than elsewhere. *Lerantina* is exclusively found in Asia Minor and Cyprus, and *Pomatia* may be considered as chiefly Austro-Turkish. The only Palaearetic species of *Tornatellina* occur near Jerusalem. *Xerophila*, though well represented here, is perhaps more of a western subgenus, and *Iberus* and *Macularia* are almost absent. On the other hand, of the true *Zonites* all but one (*Z. algirus*) are peculiar to this Division, and *Mesomphix* (subgenus of *Hyalina*) has some fine forms in the Caucasus.

Central Asia is as yet imperfectly known, and it is doubtful where the boundary between the Northern and Mediterranean Regions should be fixed. Our knowledge of it is principally derived from V. Martens' "Fedtschenko's Reise in Turkestan," which, notwithstanding its German title, is unfortunately printed in the Russian language, so that only the Latin diagnoses, list of species, and the plates are available for the vast majority of European naturalists. The presence of the Palaeotropical and Australasian genus *Macrochlamys* is remarkable, as is also that of a species of *Cyclotus*. There are 5 species of *Buliminus*. Along with these are many northern forms, *Hyalina nitida* and *fulva*, *Helix costata*, *Cionella lubrica*, etc.

B. The Italian Division (including the South of France). This may be considered as occupying an intermediate position between the others. The genus *Clausilia*, so abundant in the Austro-Turkish Division, is, as we have seen, well, but not commonly, represented. *Buliminus* has but few species. The s.g. *Campylaea* is abundant and we now come upon many of the forms characteristic of the western portion of the Mediterranean, *Macularia* for instance. *Iberus* belongs almost exclusively to this Division.

Stenogyra decollata is very abundant. The curious *H. nautiliformis* (section *Drepanostoma*) is found in the Italian Lake District. Sicily has many forms peculiar to itself, especially a group of very strongly coarctate *Clausilia*, *C. syriaca*, *C. galathaea*, now made into a subgenus under the name of *Siciliaria*. Corsica and Sardinia have already yielded some distinct forms, and will probably produce more when better explored. Even the small islands, like Malta, Lampedusa, etc., have distinct species. Malta has, amongst others, *Helix (Iberus) melitensis*, *H. (Xerophila) meda*, *Clausilia oscitans*, *delicate* and *mamotica*, and *Cyclostomus melitensis*. In Lampedusa is found *Clausilia Lampedusæ*.

C. The Hispano-Algerian Division. Possibly the Spanish Peninsula and Africa would be better separated, but there are so many species, especially amongst the *Macularia* common to both, that we are unwilling to multiply divisions for the present. In this we have the direct opposite of the Austro-Turkish Division. *Clausilia* and *Buliminus* are almost absent, whilst *Macularia* is in immense numbers, 24 species out of 31. *Leucoschroa* is represented by several curious forms, especially in Morocco (*L. turcica*, *Mogadorensis*, *degenerans*, &c.) *Fruticicola*, so abundant in the rest of Europe, is comparatively scarce here, doubtless on account of the dry climate and scarcity of deciduous trees. *Campylaea* and *Pomatia* also are almost absent. *Xerophila*, on the contrary, is fairly represented. A large number of species of *Cionella* (especially of the subgenera *Azeca*, *Ferussacia*, and *Acicula*, have been described from Algeria, but it is doubtful how many are good species. With regard to the *Cyclostomidae*, this Division is remarkable for possessing the only two species of *Lentilium*, *mamillosum*, common to Spain and Algeria, and *scrobiculata*, lately discovered in Morocco, and the only European *Phobetor*, *T. ferruginea*, found in the Balearic Islands and at Gibraltar. A speciality of this fauna, caused doubtless by the dry climate, is the prevalence of white calcareous shells.

3. THE ATLANTIC REGION.—The faunæ of the Archipelagoes forming this region are so diverse that they might almost be considered distinct, but they have certain features in common. Geological research has shown these Islands to have been the result of separate volcanic upheavals, and that they are not fragments of a former Atlantis, as was at one time supposed. The subgenus of *Helix*, *Leptaxis*, and the operculate genus *Craspedopoma* are specially characteristic.

A. The Azores. These islands are known chiefly from the researches of Morelet and Drouet, of which the results were published in 1860 by Morelet (*Notice sur l'Histoire naturelle des Açores*). 69 species were described, 28 being European shells of wide distribution, and several others common to the other Atlantic Islands, as *Helix paupercula* to Madeira and the Canaries, *H. armillata* to Madeira and the Cape de Verdes, *H. erubescens* to Madeira. 33 species only are peculiar. The most striking features of the fauna are no less than 7 species of *Vitrina*, of moderate size, 6 species of *Leptaxis*, 3 peculiar *Hyalinae*, several *Bulimini* of the s.g. *Napaeus*, 5 species of *Pupa*, of a peculiar group, allied to those of Madeira, and one *Craspedopoma* (*C. hespericum*).

B. The Madeira Archipelago, comprising Madeira, Porto Santo, the Desertas, and a few islets; perhaps the most thoroughly worked ground out of Europe. Lowe, Albers, Wollaston, and Castello de Paiva are the most distinguished names in Madeiran conchology. Albers published a monograph many years ago, giving figures of all the species, but the more recent work of Castello de Paiva is naturally the most complete enumeration, and all the species and varieties are fully described, though only the novelties are figured.

The fauna of Madeira is far more special than that of the Azores. There are 1 sp. of *Arion*, 4 of *Limax*, 2 of *Testacella*, 3 of *Vitrina*, 93 of *Helix*, 1 of *Stenogyra*, 11 of *Cionella*, 25 of

Pupa, 3 of *Clausilia*, and 4 of *Craspedopoma*. The extra Madeiran distribution of some of these has formed the subject of a paper by the Rev. R. B. Watson in the 1876 volume of "The Journal de Conchyliologie." Mr. Watson enumerates 28 species as common to Madeira and other localities, of which 25 are found in Europe, and also for the most part in some of the other Atlantic Islands, whilst *H. paupercula* occurs in the Azores and Canaries, *H. armillata* in the Azores, and *Vitrina Teneriffie* in the Canaries.

It may be remarked how this proportion of indigenous species, of species common to two or more archipelagoes, and of European shells (the latter chiefly introduced) bears out the theory of the separate origin of the different groups of islands. Had they ever formed part of an Atlantis, we might have expected to find a large proportion of shells common to all the groups, some few peculiar species in each, and a few common to the Atlantis and Europe. Instead, we find in all the groups, except the Azores, a vastly preponderant number of purely local forms, very few common to two or more groups, and a certain number of European shells of wide distribution, many probably introduced by human agency; and, with regard to the Azores, the preponderance of European forms is due rather to the poverty of the local fauna than to an absolutely greater number of introduced species. The most characteristic Madeiran groups are *Helix* s.g. *Leptaxis* (9 species), *Janulus* (3), *Actinella* (17), *Ocoteiphila* (22), *Craspedaria* (2), *Plebecula* (5), *Tectula* (11), *Lampadia* (1), *Crenea* (2), *Cionella* (11), *Pupa* s.g. *Charadrobia* (14), *Eryma* (5), *Craspedopoma* (4).

We may state here, once for all, that it is impossible for us to enter upon the subject of the detailed distribution of species in the separate islands of a division without extending this paper to an inordinate length.

C. The Canaries. Until a few years ago these islands were comparatively unknown, but recently the principal islands have

been explored by Fritsch and Wollaston, and Professor Mousson (*Révision de la Faune des Iles Canaries*) gives a good account of the land mollusca. The following are the numbers: *Limax* (3), *Plectophorus* (1), *Parmacilia* (3), *Testacella* (2), *Vitrina* (6?), *Hyalina* (8), *Helix* (109), *Buliminus* (24), *Stenogyra* (1), *Cionella* (10), *Pupa* (11), *Cyclostomus* (4), *Craspedopoma* (1), *Pomatias* (1). 15 species are cited by Mousson as European. We have already mentioned the few species common to the Canaries and Madeira or the Azores. It, therefore, follows that almost all the Canarian species are peculiar, thus confirming what we have just said in considering the Madeiran shells. The most prevalent characteristic groups are *Vitrina* (6 species), *Helix* s.g. *Monilearia* (9), *Discula* (6), *Gonostoma* (7), *Iberica* (8), *Hemicycla* (10), *Buliminus* s.g. *Napaeus* (20), *Pupa* s.g. *Charadrobia* (3). The s.g. *Leptaxis* is comparatively poorly represented by 3 species, and this is the extreme limit of the s.g. *Leucostoma*, represented by 3 species. *Clausilia* has not been found. The *Pomatias* (*P. Barthélémyanum* Shutt.) is considered as doubtful, the only authority for assigning it to the Canaries being one specimen so marked in the Marseilles Museum. M. Mousson shows, by an examination of the various groups, that not only are there scarcely any species common to Madeira and the Canaries, but that many of the subgenera are different, or represented in very different proportions in the two Archipelagos. (It may be well to state that the "Love" of the text of Professor Mousson's work is a misprint for "Lowe," the name is right enough in the plates, but strange to say almost always mis-spelt in the text).

D. The Cape de Verdes are miserably poor in mollusca. Most of the few that exist were discovered by Dr. Dohrn, who published the fauna of the islands in the "Malakozoologische Blätter" for 1869. There are 3 species of the s.g. *Patula*, 6 of *Leptaxis* (the characteristic group), 1 of *Cionella*, 2 of *Buliminus*, 4 of *Pupa*, and 2 of *Succinea*. This wretched fauna is due to the arid climate of the Islands.

III. The Ethiopian Province.—We include in this Province all Africa to the south of the Sahara, and the southern part of Arabia. At two points only are its boundaries ill defined, along the course of the Nile (Abyssinia even has certain shells of a Palearctic facies, and we do not know where the purely Mediterranean fauna begins in Nubia), and similarly on the narrow zone of comparatively fertile land on the Atlantic side, though the fauna of Senegambia is purely Ethiopian and that of Morocco Mediterranean, the point of contact between the two is undetermined. Elsewhere the Sahara forms an impassable barrier. We come here upon a perfectly distinct fauna from those we have hitherto met with; its principal features are the abundance of *Achatina* and allied genera—*Periacris*, *Limicolaria*, etc., and of *Emenea*, together with, on the whole, a comparative scarcity of *Helices*, those that are found being of different subgenera from the *Helices* of the Palearctic Province. *Pupa* is rather poorly represented. *Clausilia* exists only in Abyssinia. *Cionella* has completely disappeared. On the other hand, *Nanina* and *Streptaxis* appear for the first time.

The division of this Province must as yet be imperfect, the interior being insufficiently explored. We may, however, recognise the following regions:—

1. *THE WEST AFRICAN.*
2. *THE SOUTH AFRICAN.*
3. *THE EAST AFRICAN.*
4. *MADAGASCAR.*
5. *THE MASCARENES AND SEYCHELLES.*
6. *ABYSSINIA.*

1. THE WEST AFRICAN REGION. This region, extending from Senegambia to about the southern tropic, can hardly be subdivided. Our knowledge of it is chiefly derived from Morelet's works, especially as to the southern part, and we would recom-

mend all who wish to study this fauna to consult that author's "Voyage du Dr. Welwitsch dans les royaumes d' Angola et de Benguela," and "Séries Conchyliologiques 1^{re} livraison." *Nanina* is pretty abundant, especially the subgenus *Thapsia*. *Streptaxis* has several species, including the fine *S. nobilis* from Liberia. *Helix* proper is almost absent. *Ennea* are numerous. Of *Buliminus* there are 15 species of the s.g. *Rhachis*. A peculiar group of shells is found, referred by some to *Glandina*, but more probably belonging to *Stenogyra*, *S. Fraseri*, etc. *Limicolaria*, *Pridoris* and *Achatina* are very fine and abundant, indeed this may be considered the metropolis of that group. The fine genus *Pseudachatina* is peculiar. Operculate shells are excessively rare. Only two species of *Cyclophorus* have been recorded. One species of *Carychium* has occurred.

PRINCE'S ISLAND, in the Gulf of Guinea, has an interesting fauna. Besides a few species of the Continental genera, there are four of the curious genus *Streptostele* and two of *Columna*. *Nanina Folini* and *Adansonic* belong to a peculiar conical group and *Achatina sinistrorsa* is remarkable, not only for the reason implied in its name, but from its large size for a species of so small an island. St. Thomas and Fernando Po are less rich, or perhaps less explored, each has a species of *Pseudachatina* and in the former is found the curious *Achatina? barbigera*.

2. SOUTH AFRICAN REGION. In this region, of which the northern boundary may be taken to be the Tropic of Capricorn, we have a fauna which, while it has some features in common with the Western Region, has also many striking peculiarities. *Achatina* of large size still occur, and 1 species of *Limicolaria* has been found. *Ennea* is pretty abundant, especially in Natal. On the other hand, the true *Helices* re-appear, the principal subgenus being *Pilla* (27 species), a group almost peculiar to the Cape. There are 6 species of *Dorcasia* (*H. globulus*, etc.), 1 *Erope*,

1 *Phasis*, and 1 *Ampelita*. *Buliminus* is represented by 8 species and *Stenogyra* by 4. There are 3 *Pupae* of the remarkable sinistral s.g. *Faula*, and 5 of more normal form; and there is a species of *Cæliaxis*. The operculate shells are not quite so scarce as in Western Africa; they number *Cyclotus* 1, *Cyclophorus* 2, *Tropidophora* 1, *Cyclostomus* 3, *Tudora* 1, *Realia* 1.

THE ISLAND OF ST. HELENA can scarcely be referred to any African Region, the reference of the subfossil *Bulimus auris-vulpis* to *Pseudachatina* being doubtful. 3 *Succineæ* are found, 1 belonging to s.g. *Helisiga*. 1 *Helix* has been referred to *Charopa*, and 2 to *Endodonta*, both these being Australasian genera, whilst another has been considered to be a *Cochlostyla*.

TRISTAN D' ACUNHA has yielded nothing more than the 2 *Balaæ* mentioned by Woodward.

3. EAST AFRICAN REGION. Dr. Sclater considers Madagascar as a sub-province, under the name of the Lemurian. If such a division is to be adopted for the Mollusca, we think it would be advisable to include in it our regions 3, 4 and 5, and characterize it by the abundance of *Cyclostomidae*, especially *Tropidophora*, *Cyclostomi* of similar form, and *Otopoma*. In the region we are now considering we may define three divisions, rather, however, geographical than zoological—the mainland of East Africa with Zanzibar, the Comores, and Arabia with Socotra.

A. East Africa. Two species of *Trochamorpha*, 1 of *Streptaxis*, 2 of *Ennea*, 10 of *Buliminus*, 1 of *Cylindrus*, 5 of *Achatina*, 2 of *Otopoma*, 2 of *Tropidophora*, and 1 of *Cyclostomus* have been recorded. One species has been referred to *Glandina* (*G. Boivini*) and 1 to *Electra*, but the former being an American and the latter an Indian genus, we consider these identifications as doubtful.

B. The Comores. These islands have 1 *Vitrina*, 1 *Thapsia*, and 2 *Dorcasia*, besides a few species of the genera also found on the mainland.

C. *Arabia and Socotra.* This arid region has a peculiar fauna of the same cretaceous aspect that we noticed in North Africa, though the genera are different. 11 species of *Buliminus*, 4 of *Otopoma*, 2 of *Tropidophora*, and 3 of the peculiar genus *Lithidion* are its principal features.

4. *MADAGASCAR.* This island is much better known now than in Woodward's time, and if it has not fully come up to the rather extravagant expectations formed, has at least furnished many fine species. Its fauna is principally distinguished by the abundance of magnificent species of *Cyclostomidae* of typical form (*Tropidophora* 24 species, *Cyclostomus* 30, *Otopoma* 3, *Lithidion* 1), and by *Helices* of the s.g. *Ampelita* (including *sepulchralis*, *omphalodes*, etc.) 26, and the splendid s.g. *Helicophanta* (*H. magnifica*, *Souverbiana*, etc.), 9 species. The genus *Euptychia*, recently described by Crosse and Fischer, is very curious, possessing transverse lamellae, the only other instance of this in the *Cyclostomidae* being *Cyclophorus foliaceus* from the Andamans. The presence of a species of *Cochlostyla* (*C. viridis*) is curious. There are also 2 species of *Nanina* that have been referred to *Xesta*. 3 very large species of *Achatina* and 6 of *Ennea* exist, a proof of the affinity of the fauna to that of the mainland of Tropical Africa.

5. *THE MASCARENES AND SEYCHELLES.* The fauna of these islands is not, as might have been thought likely, a mere offshoot of that of Madagascar, but on the contrary, almost as distinct from the Malagassian fauna as the latter is from that of the mainland. Though all the islands have peculiar species, some features are common to them all; the abundance of *Gymnospira*, a genus formerly confounded with *Pupa*, but now found to be carnivorous, and placed near, or even joined to *Zonaria*, the absence of *Nanina* in tolerable numbers, and the rarity of true *Helices*. All have been well explored. An excellent account of the mollusca, both terrestrial and marine, of Réunion has been published by

Deshayes, and the fauna of the little island of Rodriguez has been monographed by Crosse. We are not aware of any monograph of the fauna of Mauritius, but, though it has to be sought for in various publications, the malacology of Mauritius is about the best worked out of any. The Seychelles are perhaps not so fully explored as the rest of the Region, but still are very fairly known.

A. *Mauritius*. The genus *Nanina* is abundant, and contains some peculiar forms (*Erepta* and *Styloodon*). *H. inversicola*, formerly referred to *Caracolus*, has also been shown by Messrs. Binney and Bland to be a *Nanina*. The species of *Gonospira* are very numerous (27), and there are 3 of the peculiar genus *Gibbus*. There is 1 *Hainesia*. *Realia*, a genus we shall often meet with again, is represented by 10 species. The typical *Cyclostomidae* are not so very numerous as in Madagascar, nevertheless there are 2 species of *Otopoma*, 1 *Cyclotopsis*, 2 *Tropidosphora*, and 2 *Cyclostomus*. 1 species has been referred to *Simpulepsis*, which must be considered rather doubtful, and 1 to *Tornatellina*.

B. *Reunion*. There is one species of *Vitrina*, a genus absent elsewhere, in the East of Africa. There are several *Naninae* (including 1 *Xestia*), 6 species of *Gonospira*, 1 *Tornatellina*, and 4 species of *Realia*.

C. *Rodriguez*. Except a species of *Streptaxis*, all the shells of this island are of the same genera as those of Mauritius and Réunion.

D. *Seychelles*. The shell formerly called *Helix unidentata*, now *Nanina (Styloodon) unidentata* is characteristic of these islands, which have also the following genera, not found in Mauritius, etc., *Hyalina* 1, *Streptaxis* 1, *Streptostele* 1 (a genus only occurring elsewhere in Prince's Island, on the West Coast), *Cyathopoma* 1 (an Indian genus), *Leptopoma* 1 (a genus of the East Indian Archipelago), *Helicina* 1 (the first appearance of this genus).

6. **ABYSSINIA** is comparatively badly explored, but Blanford, Issel, and Jickeli have made us acquainted with some portions. Issel's discoveries have been published by Morelet. Jickeli has given us a work on the fauna of N.E. Africa. As already stated, the fauna has evidently received some additions from the Palæarctic Province; this will be seen by the following list, where the Palæarctic genera, etc., are in italics: *Vitrina* 20, *Succinea* 2, *Acanthinula* 1, *Hemiplecta* 2, *Hyalina* 2, *Pella* 1, *Euparypha* 1, *Patula* 4, *Monacha* 1, *Buliminus* 5, *Cylindrus* 1, *Stenogyra* 8? *Limicolaria* 9, *Achatina* 1, *Homorus* 2, *Pupa* 14, *Clausilia* 2. The presence of a species of *Pella*, of which all the others are from the Cape, is remarkable, as is also the total absence of the operculate shells.

IV. **The Palæotropical Province.** We include in this Province, India, Ceylon, the Transgangetic Peninsula, the Andamans and Nicobars, China with Formosa, Japan and the Loochoo Islands, the Philippines, Borneo, Sumatra, Java and the other East Indian Islands, to and inclusive of Bali. To the west, the boundary between it and the eastern portion of the Mediterranean Region is undetermined, and to the north there is probably no certain limit. Amooria is almost completely Palæarctic, whilst South China is as clearly Palæotropical. In Japan, even, there is a certain mixture of northern forms. This Province is one of the richest, or perhaps the richest of all, both in genera and species. The fauna of the separate regions differ a good deal, but the following may be taken as general characteristics: *Vitrinæ* are abundant, especially those now referred to *Holcarion*. *Nanina* is most richly represented, and by many magnificent species. *Trechomorpha* is found almost everywhere. The *Amphidromi* occur almost throughout the region. The operculate shells attain a development unparalleled elsewhere in the Old World, though strange to say true *Cyclostomi* scarcely exist, but *Cyclophorus* and *Cyclotus*, with their allies are most abundant, and we now come

upon the *Diplommatinacea*, the *Pupinacea*, and the various genera with sutural tubes, such as *Alycaeus*, *Opisthoporus*, etc. *Helicina* also first occurs in any numbers in this Province, though it is not so rich as in the Australasian and Palaeotropical Provinces.

1. India. Very much has been done in this Region since Woodward's time. Blanford, Beddome and Godwin Austen deserve special mention, and Hanley and Theobald have published the "Conchologia Indica," which, though it contains no descriptions, and sometimes leaves something to be desired in the execution of the plates, has at least the merit of giving, for the first time, an illustrated catalogue of all the Indian mollusca. *Vitrina* has 12, *Succinea* 10 species. There are 2 species of the curious genus *Lithotis*, separated from *Succinea*. *Nanina* includes 26 species of *Macrochlamys*, 11 of *Xesta*, 13 of *Ariophanta*, besides many others not yet referred to subgenera. There are 6 species of the curious subgenus *Plectopylis*. *Arionta* has 1 species, *Fruticicola* 1, *Plectotropis* 2, *Eurystoma* 1, *Trachia* 5, *Planispira* 1, *Couilla* 5, *Oxytes* 1. The peculiar genus *Boysia* occur here. *Streptaxis* has 4 species, and *Ennea*, though more African than Indian, 6. We come for the first time on *Amphidromius* (2 sp.), and *Geotrochus* 1. There are 46 species of *Buliminus* and 5 of *Cylindrus*, the latter from the N.W. portion of the region, in the vicinity of the Palaeartic Province. The genus *Electra* (or *Glessula*) is highly characteristic of the Indian Provinces and Ceylon. Here there are no fewer than 53 species. 1 species has been referred to *Spiraxis*. As already mentioned, there are several species of *Clausilia* in the Himalayas. The following are the operculate genera: *Cyclotus* 2 species, *Mychopoma* 2, *Cyathopoma* 21, *Spiraculum* 3, *Pterocyclos* 6, *Alycaeus* 53, *Opisthostoma* 5, *Diplommatina* 29, *Nicida* 6, *Scabrina* 1, *Cyclophorus* 29, *Lagocheilus* 1, *Ditropis* 3, *Tropidophora* 1, *Otopoma* 1, *Cycletopsis* 1, *Pupina* 1, *Megalostoma* 2, *Catalus* 1, *Streptaulus* 1, *Pomatias* 2, *Realia* 1, *Georissa* 2. The existence of 2 species of *Pomatias* so far away

from Europe is very remarkable. The genus *Camptonyx* must almost be included amongst the terrestrial shells, though belonging to the *Limnaeidae* and *Cremniconchus*, one of the genera of *Littorinidae*, is purely terrestrial. This is after all only the extreme of what we see in *Littorina rufa*, which is often found where only the spray can reach.

2. Ceylon. This island has special features. Besides a number of genera also found in India, the following occur: *Acarus* (*Helix hamastoma*, etc.) 8, *Aulefoma* 4, *Leptophoma* 3. *Catalus* is almost exclusively Cingalese, 14 species occurring here and only one on the mainland. On the other hand, *Diplommatina* has but few representatives, 2 only. The species are almost all different from those of the mainland.

3. The Transgangetic Peninsula. The fauna of this Region, though on the whole very similar to that of India, yet is marked by a still greater variety of the operculate genera, especially by the strange form *Hybeccitis*. *Amphidromus* also appears in numbers, and *Clausilia* are more numerous and of finer forms. We divide this region into

A. Burmah with the Tenasserim Provinces.

B. Siam with the remainder of the Peninsula of Malacca.

C. Cochinchina and Cambodia.

A. Burmah. *Nanina* is very well represented, including the peculiar subgenera *Sephina* 4 species and *Sesara* 7. There are some fine *Vitrinae* (*Heliacornis*) as *V. prestans*. In the genus *Helix* the s.g. *Plectopylis* is chiefly remarkable. *Streptaxis* has 9 species. The curious genus *Plectotropis* occurs here (3). There are no less than 14 species of *Clausilia*. *Electra* still occurs, but not so numerous as in India and Ceylon (5 species). The operculate fauna is particularly rich, comprising *Opisthoporus* 1, *Rhoistoma* 1, *Spiraculum* 2, *Pterocyclas* 4, *Alycaeus* 17, *Hybeccites* 1, *Diplommatina* 7, *Palaina* 1, *Clostaphis* (rather a problematical genus,

founded on a single specimen, since lost) 1, *Scabrina* 2, *Cyclophorus* 20, *Lagecheilus* 2, *Leptopoma* 1, *Megalomastoma* 1, *Rhaphaulus* 2, *Pupina* 2, *Helicina* 2, *Georissa* 9.

B. *Siam* is not so well known as Burmah. The genera are very much the same, except that *Sesara*, *Sophina* and *Plectophylis* do not occur, or at least have not yet been found. *Amphidromus* is much more abundant (13 species) *Clausilia* less so (4). No *Helicina* or *Georissa* has been found, and, on the other hand, there are 5 species of *Realia*.

C. *Cochinchina* and *Cambodia* were until lately almost unknown, and even now have only been very partially explored. The 4th part of Morelet's "Séries Conchyliologiques" gives a résumé of all that is known of the fauna. The *Naninæ* known are less numerous than those of Burmah and Siam, but include the magnificent *N. Cambojensis*. Two species have been referred to *Zonites*. In the true *Helices* there is 1 *Planispira*, showing the affinity with the East Indian Archipelago. One has been referred to *Ophiogryra*, probably *Plectophylis*, as *Ophiogryra* is an American group. There is also said to be a *Hadra*, rather doubtful, this being rather an Australian group. *Streptaxis* is numerously represented (8 species); also *Amphidromus* (11). Of *Clausilia* only 3 species are as yet known, but 1 is the magnificent *C. Mouhoti*. In the operculate shells the most remarkable are *Myxostoma breve*, from Poulo Condor Island, and *Helicina* or *Trochatella* *Mouhoti*.

4. The Andaman and Nicobar Islands. These islands are very similar in their fauna, and both archipelagoes are related to the Indo-Malayan Province. *Naninæ* are numerous, including, in the Nicobars, the peculiar subgenus *Sagelinella*. *Streptaxis* and *Amphidromus* are represented, but by few species. In the Andamans there are 2 fine species of *Spiraxis*? One *Clausilia* has been described from the Nicobars. The operculate shells are numerous, comprising the genera *Cyathopoma* (Andamans), *Cyclotus*

(Nicobars), *Alycaeus* (A. & N.), *Cyclophorus* (A. & N.), *Leptopoma* (N.), *Catalus* (N.), *Pupina* (N.), *Realia* (A.), *Helicina* (A. & N.). The *Cyclophori* include the curious lamellated *C. foliaceus*. The *Helicinae* (*H. Andamanica*, *Nicobarica*, etc.), are elegant shells.

5. **China with Formosa.** The interior of China is very imperfectly known, and it would be premature to attempt to fix the exact boundaries between this and other regions. To the north there is evidently an intermixture of Palaeartic forms, and the same thing would appear to be the case on the south-east, the enormous altitude of that part of Central Asia having caused the northern fauna to spread and excluded tropical forms. The most striking peculiarity of the Chinese fauna is the abundance of sinistral *Helices*, *H. cicatricosa*, *Christinæ*, etc. *Naninae* are comparatively few, whilst true *Helices* are numerous, especially of the subgenera *Camena*, *Plectotropis* and *Fruticicola*. *Corila* has 1 species, *Obba* 1, *Acusta* 2, *Hadra* 3. *Streptaxis* is represented by 2 species. *Stenogyra* and *Clausilia* are both numerous. On the other hand, the operculate shells begin to diminish in numbers, as is always the case as we go towards the north. The following genera exist: *Cyclotus* 2, *Pterocyclus* 2, *Alycaeus* 2, *Paxillus* 1, *Cyclophorus* 3, *Otopoma* 1, *Realia* 1, *Cecina* 1, *Helicina* 1; but almost all these are from the south of China, except the genus *Cecina*.

THE ISLAND OF FORMOSA has been tolerably well explored, chiefly by Mr. Swinhoe. It is principally remarkable for a *Bullimus* of very peculiar form, *B. sphaerocanthus*, and for some fine species of *Clausilia*—*Swinhoei*, *exilis*, etc.

A good account of the Chinese land shells (then known) will be found in Martens' "Preussische Expedition nach Ostasien."

The Thibetan shells seem to be largely of Palaeartic forms, the *Helices* are mostly of the s.g. *Fruticicola*, and there are no less

than 7 sp. of *Buliminus*. We owe our knowledge of these shells almost entirely to the Abbé David and the late Prof. Deshayes, the former having collected, and the latter described them.

6. Japan. The Japanese Islands were, till a few years ago, almost completely *terra incognita*, but since the opening of the ports to Europeans, and especially since travelling in the interior has been possible to some extent, our knowledge of the Japanese fauna has rapidly increased, and we find that it is equally remarkable for the number and for the beauty of the forms. A. Adams and V. Martens have both collected and described Japanese land-shells. The descriptions of the former naturalist are unfortunately scattered through the Zoological Proceedings, a work which, while it may be described as a mine of wealth for conchologists, unfortunately justifies the analogy to a mine still further by the conchological papers, the ore, so to speak, being imbedded in a vastly preponderating mass of articles not bearing on the mollusca, which may properly be compared with the quartz or other matrix. V. Martens' "Preussische Expedition, etc.,," on the other hand, gives a complete account of the Japanese land shells up to the date of publication, but, unfortunately that is several years back, and since then Dr. Kobelt has described many new species collected by Rein. There are several species of *Hyalina* and *Fruticicola*, a trace that northern influences are beginning to appear, though the general character of the fauna is clearly Palaeotropical. *Nanina* is represented by few species. The characteristic subgenera of *Helix* are *Camena* 17 and *Plectotrepis* 8 species. There are 2 species of *Hadra*, 2 of *Aegista*, and 1 of *Doreasia*. The *Bulimini* are very few (2 only). *Balea* has 1 species and *Clausilia*, as already stated, is represented by numerous and handsome forms (20 species). It is especially the operculate fauna that proves the Palaeotropical character of this province. The following are catalogued by Pfeiffer: *Cyclotus* 3, *Ceolopoma* 1, *Alysaeus* 2, *Cyclophorus* 2, *Pupina* 1, *Pupinella* 1, *Helicina* 2, *Realia* 3.

7. Philippines. These islands contain the finest assemblage of land shells to be found anywhere, whether regard be had to the number of species or to the beauty of the shells. In consequence of Cuming's explorations, they have been known for a longer period than most other extra-European localities, but still Semper and others have been able to make considerable additions to the list. It is a pity that no good general work on the Philippine land shells exists; Semper's is chiefly anatomical. The most striking characteristic of this fauna is the genus *Cochlostyla*, which is here represented by 172 species. These shells were formerly included in *Helix* and *Bulimus*, but the fact that several were sometimes placed in the one and sometimes the other genus, seemed to indicate that a new grouping was required, and now the genus *Cochlostyla*, chiefly distinguished by the hydrophanous epidermis, is pretty generally recognized. 21 species of *Vitrina* are attributed to these Islands: they almost all probably belong to *Heliacorion*. *Nanina* are numerous, including some very large species of the subgenera *Rhysota* and *Hemiplecta*, especially *N. ovum* and *maxima*. The genus *Trochomorpha* now becomes abundant (14 species). The *Helices* are tolerably numerous, and include some subgenera that we have not before met with, and that are characteristic of the Eastern Islands, e.g., *Chloraea* 8, *Obba* 15, *Chloritis* 2, *Planispira* 1, *Axina* 9. The subgenus *Corasia* (21 species), including many beautiful species, as *regina*, *virgo*, *puello*, etc., is by some included in *Helix* and by some in *Cochlostyla*. 14 species are referred to *Hadra*. *Amphidromus* exists, but there are only 2 species. One shell has been referred to *Endodonta*, an Australasian, and 1 to *Stylocodon*, a Mauritian genus. The shell formerly called *Cylindrella Cumingiana* is now considered by Dr. Dohrn to be an *Ennea*.

We may mention that we had not seen his paper in the *Mak. Blaetter* when we wrote a short article on *Cylindrella* for the "Quarterly Journal of Conchology." In that article, how-

ever, we expressed doubts as to the generic position of *C. Cum-ingiana*. Not possessing the species in our collection, we could not pretend to decide on its true genus.

Stenogyra is numerous (10 species). The operculate shells chiefly belong to the genera *Cyclotus*, of which there are 16 handsome species, though scarcely so fine as those of Burmah, and *Leptopoma* 22, *Cyclotus* has 7 species, *Alycaeus* 1, *Arinia* 1, *Megalomastoma* 1, *Pupinella* 2, *Pupina* 7, and *Helicina* 9 species. We may remark the greater numbers of *Pupina* and *Helicina*, together with the reduction of the tubiferous genera to a single *Alycaeus*, as indicating the passage to the Australasian fauna.

8. Borneo is still very imperfectly explored. The largest collections have been made in the Island of Labuan, and in Sarawak. The *Naninae* are numerous and fine, especially the splendid reversed shell *N. Brekei*. Amongst the *Liellae*, *nasuta* may be mentioned as a most remarkable form; there are, however, few true *Helices* known as yet from Borneo, and *Cochlostyla* is only represented by 1, and *Amphidromus* by 2 species. There is 1 *Electra*, and 2 *Clausilia* are found. The operculate fauna is interesting. There is 1 species of the curious genus *Opisthostoma*, in which the last whorl turns up in the form of a tube in a most extraordinary fashion (*O. Crispignyi*). There are said to be 3 species of *Paxillus* but their specific distinction is rather doubtful. The other operculate genera are *Cyclotus* 2, *Opisthoporus* 3, *Iterocyclos* 5, *Alycaeus* 3, *Diplomatina* 1, *Cyclophorus* 5, *Leptopoma* 6, *Megalomastoma* 3, *Rhaphaulus* 2, *Pupinella* 1, *Realia* 5, *Helicina* 2. The most complete account of the Bornean land shells is Prof. Issel's "Molluschi Borneensi"; Borneo, however, together with all the Dutch Islands is also treated of at length in V. Martens' "Psische Expedition."

9. Sumatra to Bali. The chain including Sumatra, Java, Bali, and the neighbouring small islands may be considered as a distinct

region; though it must be confessed that there does not seem to be in the mollusca that sharp distinction between the Philippines, Borneo, and Sumatra-Bali on the one side, and Celebes and the Moluccas, and Lombok-Timor on the other, that has been observed in other departments of Zoology. The leading Molluscan features of the Australasian Province do not appear, as we shall see, till much further to the East, whilst *Nestig*, *Hemiplecta*, *Amphidromus*, and other Indo-Malayan groups are found in Lombok, Timor, Celebes and the Moluccas. This chain of islands is not so rich as might be expected. The land shells of the comparatively small island of N. Caledonia are far more numerous than those of all this group. The fauna of Jawa was described many years ago by Mousson, the most recent account of the land shells of these islands is in Martens' work above referred to. Large *Naninae* are numerous, generally of obscure colors. Of *Helices* there are few, 5 are referred to *Fruticicola*, 6 to *Plectropis*, and only 1 to *Gastrochus*. *Amphidromus* has 8 species, *Cochlostyla* 1. There is also 1 *Buliminus*. *Stenocera* is represented by 6 and *Clavilida* by no less than 9 species. The operculate genera are *Cerithium* 1, *Pitangua* 1, *Alysia* 3, *Cyliphorus* 3, *Opisthopoma* 3, *Lepropoma* 5, *Pupina* 2, *Helicina* 2.

V. Australasian Province. It is rather in accordance with the views of Lyell and Wallace than with our own convictions to make this Province begin here; we would have preferred to include the islands from Lombok to Timor, Celebes, the Moluccas, and New Guinea in the Palaeotropical Province as the leading peculiarities of the Province are not found to any extent till we get to the eastward of those islands. We also consider it doubtful how far Australia, New Zealand, and the Polynesian Islands can be considered to belong to the same Province. We divide the Province into 5 great Regions, viz. :—

1. The Moluccan.
 2. The West Polynesian.

3. The East Polynesian.
4. The Sandwich Islands.
5. The Australian.

1. The Moluccan Region includes those groups of which we have already spoken as more Palaeotropical than Australasian. Large *Nanina*, generally of brighter colors than those of Java and Sumatra, abound, whilst the small species so characteristic of Polynesia are comparatively few. The Malayan subgenera of *Helix*, *Planispira Chloritis*, *Corasia*, etc., are numerously represented. *Amphidromus* has been found everywhere except in New Guinea. *Partula* has only 1 species, and that in New Guinea. Several genera of operculates continue that are altogether lost in Polynesia. *Leptopoma* and *Pupina* are abundant. *Placostylus*, that distinctive genus of West Polynesia, has not a single species. The examination of the separate groups will show this more distinctly.

A. Lombok to Timor. The following are the land shells:—
Nanina s.g. *Hemiplecta* 3, *Xesta* 2; *Trochomorpha* 1; *Helix* s.g. *Plectropis* 1, *Dorcocia* 1, *Fruticicola* 1, *Rhagada* 1, *Planispira* 1; *Amphidromus* 5, *Buliminus* 3, *Cyclotus* 1, *Leptopoma* 1, *Helicina* 2. It will thus be seen that except by the deficiency of some genera, naturally to be expected in small islands, this is almost identical in genera with the fauna of Sumatra-Bali.

B. Celebes. This island has not been fully explored, the northern and southern extremities are better known than the intermediate portions. Pfeiffer records *Nanina* (*Xesta* 6, *Hemiplecta* 3, *Macrochlamys* 1, *Medyla* 1, doubtful 1), *Trochomorpha* 1, *Helix* (*Obba* 4, *Chloritis* 3, *Planispira* 1, *Fruticicola* 1), *Amphidromus* 1, *Buliminus* 1, *Cyclotus* 3, *Alysceus* 1, *Cyrtospira* 1, *Leptopoma* 3, *Pupinella* 1, *Pupina* 1, *Realia* 1, *Helicina* 1. We see the nearer relation to the Philippine and Bornean fauna in the greater number and variety of the operculate shells.

C. *Moluccas.* We have here a somewhat different fauna. Its great peculiarity is the abundance of the s.g. *Pianispira* (no less than 29 species). *Chloritis* is also numerous (13 species), and *Phania* (3 species) is peculiar. There are two species of the Philippine genus *Cochlostyla*, and we find here the last species of *Clausilia* that we shall meet with in the Old World, one proof the more of the Paleotropical affinities of the fauna. The other groups are much the same as in Celebes.

D. *New Guinea*, including the Aroo Islands, Louisiade, &c. We here, for the first time, meet with an indication of Polynesian affinities in the presence of a single species of *Partula* and in the abundance of *Gastrophus* (19 species). A *Pedinogyra* indicates the proximity to Australia. A *Merope* is peculiar. The only operculates are *Cycletus* 2, *Leptopema* 5, *Pupinella* 4, *Helicina* 7. It must however be added that our knowledge of the zoology of New Guinea is very scanty, and that of the eastern part almost *nil*; and, judging from the ill success of recent attempts at settlement, we shall probably have to wait some time for a complete investigation of the island. Whether the result will be as disappointing as in Java and Sumatra, or whether New Guinea will be found to share in the conchological riches of the Solomon Islands remains to be seen.

2. The West Polynesian Region. We make this Region co-terminous with the distribution of *Placostylus*. It consists of the Solomon Islands, New Caledonia, the Fijis, and the New Hebrides; the last named islands forming a transition to the East Polynesian Region.

A. *the Solomon Islands.* These are exceedingly rich; especially in the s.g. *Gastrophus*, of which there are 55 species of great beauty. The *Placostyla* are of more aberrant sections, 13 species. *Partula*, a genus special to the Polynesian Islands has 11 species. *Trechomorpha* also is now richly represented (15). Some of the Malaisian

subgenera of *Helix* and *Nanina* are still represented but in reduced numbers, e.g., *Xesta* 1, *Hemiplecta* 3, *Chloritis* 3. On the other hand, *Cerasia*, a Philippine s.g., has 8 species. The operculate shells are not very numerous, and all the genera of Indian affinities have now disappeared, and *Leptopoma* 5, *Pupina* 4, and *Helicina* 7 species, are fully characteristic of an Australasian fauna. The presence of an *Otopoma* and of 2 species of *Cyclostromus* is curious. The former of these genera is distinctly African, and the latter, though more widely distributed, is very rare in Polynesia.

B. *New Caledonia*. The New Caledonian Archipelago has been very fully explored by the French officials and missionaries, and their discoveries have been described by M.M. Crosse, Gassies, and Souverbie. M. Gassies has published a monograph of the land and freshwater shells of New Caledonia. The types mostly exist in the Museum of Bordeaux, which is probably richer than any other in New Caledonian shells. The leading characteristics of the fauna are (1) The abundance of large, heavy species of *Placostylus* of the typical section, such as *P. fibratus*, *Souilleti*, &c. Of these 25 species are given by Pfeiffer; some of them may possibly turn out to be varieties, but in any case they are numerous; (2) Small *Helices*, generally strongly sculptured, and *Patulae*, 55 species. The uniformly small size of the *Helices* is a remarkable feature of the fauna. *H. Saisseti* is perhaps the largest—a giant compared with most of the others, and elsewhere it would not be considered a conspicuous shell; (3) The curious genus *Diplomphalus*, of a planorbiform shape. These shells, *D. Marietii*, *Megei*, etc., were formerly included in *Helix*, but M. Crosse has shown that the animals are carnivorous, and that the mollusks consequently belong to the *Testacellidae*; (4) The abundance of *Rhytida* (10 species). This genus, of ordinary heliciform shape, is also carnivorous. The *Patulae*, with internal teeth or lamelle (*Endodonta*, *Pitys*) so abundant in Eastern Polynesia, have only 3 species here. There are 7 species of *Pupa*, including one or two

reversed ones. *Tornatellina* appears with 2 species. *Helicina* becomes abundant, a true Polynesian feature (14 species). The other operculates are few. *Diplommatina* 3, *Cyclophorus* 6, *Pupina* 1, *Realia* 9. There is not a single species of *Partula*.

C. Fiji Islands. Though these Islands have been explored by Dr. Graesse, it is probable that much more will be found there. Mousson has published the fauna in "The Journal de Conchyliologie." The small zonitiform shells, doubtfully referred to *Nanina*, now begin to appear. The *Placostyli* are of the section *Charis*, such as *P. Strangei*, and of another type, including *Kororensis*, *Seemannii*, etc., of a narrower, heavier form, more like the New Caledonian shells. There are 14 *Placostyli* altogether. *Amphidromus* has 2 species, and *Partula* likewise 2. That these genera, one distinctly Hindoo-Malayan and the other as distinctly Polynesian, should both be equally represented is strange. Probably further research will prove one or the other to be predominant. *Tornatellina*, a genus widely distributed in Polynesia, has 2 species. *Diplommatina*, which after a temporary disappearance in the Malay Islands reappears in Polynesia, has 7, and the allied *Moussonia* 1 species. *Realia* is more abundant in Polynesia than elsewhere; in Fiji there are 10 species.

D. New Hebrides. These islands seem to partake of various characteristics. Whilst 2 species of *Planorbis* and 4 of *Gastrophilus* indicate a West Polynesian fauna, and 2 of *Amphidromus* even a Malayan, 6 species of *Partula* point more to East Polynesian affinities. These islands have evidently been very imperfectly explored, as besides the genera named, only the following have as yet been found: *Helix* 1, *Trochomorpha* 1, *Patula* 1, *Buliminus* 1, *Cyclotus* 2, *Diplommatina* 2, *Cyclophorus* 3, *Pupina* 2, *Realia* 2, *Helicina* 6.

3. East Polynesian Region. We include in this the remainder of the Polynesian Islands, except the Sandwich Islands, which

form a region apart. We here find a comparatively extensive fauna considering the small size of most of the islands, but an absence of any conspicuous shells.

The *Helicidae*, like those of New Caledonia, are very small, the sections with internal lamellæ being however numerous here. *Placostylus* and *Amphidromus* have both disappeared. The large *Naninae* are no longer met with, and we have finally taken leave of the fine Indo-Malayan genera of *Cyclostomidae*. On the other hand, *Partula* becomes very numerous, and with *Trochomorpha* furnishes the only shells even approaching to a moderate size. *Tornatellina* has a good many species, and amongst the operculates there are various forms of *Diplommatinidae* (*Pilosina*, *Moussonia*, etc.), of *Cyclophoridae* (*Ostreae*) and many species of *Realia*, all small shells.

A. Samoa Islands. These and the Tonga Islands have, like the Fijis, been explored by Dr. Graeffe, and the results, as far as the land and freshwater shells are concerned, have been published by Prof. Mousson in the "Journal de Conchyliologie." From the smaller size and lesser number of the Islands, it is probable that Dr. Graeffe has been able to approach much nearer to discovering the complete fauna than in the case of the Fijis. One species has been referred to *Amphibulima*, rather doubtful. There is also *Microcystis*, etc., 8, *Partula* 2, *Pitys* 3, *Trochomorpha* 6, *Spongizyma* 1, *Partula* 13, *Tornatellina* 2, *Cyclotus* 1, *Moussonia* 1, *Ostreae* 6, *Realia* 7, *Helicina* 3.

B. Tonga Islands. The genera and many of the species are the same as those of Samoa. It is remarkable that only one species of *Partula* has been found.

C. Cook's Islands. Here 3 species of *Ditropaea*, one each of *Chondrella*, *Palaina* and *Cyclamorpha* are remarkable. There are 16 species of *Pitys*. The other genera are but poorly represented. *Microcystis* 1, *Trochomorpha* 3, *Partula* 1, *Tornatellina* 1, *Pupa* 1, *Helicina* 1, *Cyclophorus* 1, *Realia* 4.

D. *Society Islands.* These have been very well explored by Pease and others, and probably we are now acquainted with the greater part of their land shells. The genus *Partula* here attains its maximum, no fewer than 42 species being recorded. It is, however, probable that some of these will not stand. *Succinea* abounds (11 species). Of *Patula* there are 8 and of *Endodonta* 6 species. There are several small *Zonitidae*. The operculate shells almost all belong to *Realia* (14) and *Helicina* (12). The only other operculates are one species each of *Cyclophorus* and *Chondrella*.

E. *Austral Islands, including Opara.* The most striking peculiarity of these islands is the occurrence of a species of *Stoatema*, a genus otherwise exclusively West Indian. The other land shells belong to groups common in the neighbouring islands, and include 6 species of *Endodonta* and 5 of *Tornatellina*.

F. *Low Islands.* We now come to the extreme eastern part of the Polynesian Archipelago, where the fauna is the poorest. Only 20 species have been recorded from these islands, of which five belong to *Microcystis* and five to *Helicina*. *Endodonta* and *Realia* have each 2, and *Pitys*, *Partula*, *Pupa*, *Cyclophorus*, *Cyclomorpha* and *Chondrella* 1 species.

G. *Marquesas.* We now begin to work our way back by the north. In the Marquesas we have the usual Polynesian fauna, of about 24 species, *Pitys*, *Partula*, *Tornatellina*, *Realia*, *Helicina*, etc. The only peculiarity is the existence of 2 species of *Vitrina*.

H. *Phoenix, Ellice, Kingsmill, and Marshall Islands.* These are chiefly coral islets and have yielded very little. The genera are *Nanina* 2, *Patua* 1, *Pitys* 1, *Stenogyra* 1, *Tornatellina* 1, *Pupa* 1, *Realia* 3, *Helicina* 2.

I. *Caroline Islands.* Returning to the westward we find a somewhat richer fauna. One species each of *Rhysoea* and *Pupina*

indicate the proximity of the Malayan Islands. *Trochomorpha* is well represented (7 species). The other shells are *Partula* 3, *Tornatellina* 2, *Pupa* 1, *Cyclophorus* 1, *Cyclostomus* 1, *Realia* 2, *Helicina* 2.

J. *Pelew Islands*. These are very remarkable for the existence of a peculiar genus of *Diplommatinacea*, of which only one or two species occur elsewhere, whilst there are 15 in the Pelew Islands, and hence it has been named *Palaina* by Semper. There are 2 species of *Pupina* and even 1 of *Chleriza*. *Partula* has 3 species.

LADRONES. From these small islands the following only are known: *Succinea* 1, *Microcystis* 2, *Helix* 1, *Partula* 6, *Realia* 2.

4. **Sandwich Island Region.** We consider the Sandwich Islands, from their peculiar fauna, as entitled to rank as a distinct region from the rest of Polynesia, from which they are also geographically remote. They have, it is true, certain Polynesian features. *Endodonta* and *Pitys* have many species (14), and *Partula* exists, but only represented by two species. There are also several of the zonitiform *Naninae*, but the following peculiarities are, we think, sufficient to constitute a distinct region: (1) The genus *Achatinella*. Of this genus 291 species have been described, all from the Sandwich Islands. Probably many so called species will turn out to be synonyms or varieties, but even a reduction of a third or a half would leave a very large number. From the anatomical investigations of Messrs. Binney and Bland, it is probable that *Achatinella* will have to be split up into two or three genera, and we are therefore disposed to admit the subfamily *Achatinellina* proposed by Messrs. Gulick and Smith, and this subfamily is exclusively from the Sandwich Islands. (2) The genus *Auriculella*, of which 19 species have been proposed, all from these islands. Included in *Achatinella* till lately, this genus is now admitted by Pfeiffer as distinct. (3) The genus *Carilla*. These are long turreted shells with a peculiarly twisted

columella, their true position is somewhat doubtful. Nine species have been described, all from the Sandwich Islands. (4) The genus or subgenus *Catinella* of Pease. These are *Succineus* of aberrant form. Pfeiffer only mentions 2 species.

The only other genera that are abundant in these Islands are *Sicula* 12, *Pupa* 9, and *Helicina* 8 species. One species has been referred to *Ferussacia*, a very doubtful identification, the shell is probably an *Achatinella*.

5. Australian Region. We include in this Region, Australia, Tasmania, New Zealand, and the following small islands: Norfolk Island, Kermadec, and the Auckland Islands.

True *Helices* exist in this region in large numbers, and of fine forms. Operculates are chiefly represented by *Pupina*, *Realia* and *Helicina*. *Partula* is altogether wanting. Taken on the whole the fauna has a much nearer resemblance to that of the Malay Archipelago than to the Polynesian.

A. Australia. The north-east coast is the richest part. Beyond the tropic land-shells are comparatively few; though some have been described even from the interior. Cox's Monograph of Australian Land Shells, published about ten years ago, gives a complete account of all those then known; others have since been described. *Vitrina*, or more probably *Hastularia*, is abundant (18 species). One species has been referred to *Simpulopsis*, though this is a very doubtful identification, *Simpulopsis* being an American genus. *Naninae* are comparatively few, 20 species. *Trochomorpha*, on the other hand, has 19 species. One species has been referred to the Madagascan s.g. *Ampelita*. The characteristic subgenera of *Helix* are *Xanthomelon* 8, *Galaxias* 13, *Pedinogyra* 2, *Hadra* 52, *Charopa* 6. There are 8 species of *Rhytida*, a genus of which we have spoken under New Caledonia. *Dorcasia* has 4 species, *Camena* 5, and *Planispira* 4; all showing a Malayan affinity. *Plectotropis*, an Asiatic genus, is represented by one species. Six species have

been referred to *Cochlostyla*, which may be correct, but we rather doubt the three so-called *Vallonicæ*. *Buliminus* is very rich, 26 species. The operculates are *Blanfordia* 1, *Diplommatina* 2, *Cyclophorus* 3, *Pupinella* 4, *Pupina* 11, *Realia* 1, *Helicina* 10, and, strange to say, if the identification be correct, one species of the Indian genus *Gorissa*.

B. Tasmania. Numerous species of *Trochomorpha* (about 20) and the peculiar subgenus of *Helix*, *Anaglypta*, of which, however, only one species is known, *H. Launcestonensis*, form the most striking features. There are 3 species of *Rhytida*, 8 of *Charopa*, and, curiously enough, 5 of *Pitys*.

C. Norfolk Island has only *Nanina* 2, *Trochomorpha* 1, *Patula* 3, *Palaina* 1, *Realia* 2, *Helicina* 1.

D. Kérmandeø only possesses *Vitrina* 1, *Macrochlamys* 1, *Thalassia* 1, *Patula* 1. We may remark with reference to the *Vitrina* that Mr. Edgar Smith's name *Kérmandeœnsis* has priority over Prof. Mousson's *ultima*. They were published in the "Annals and Magazine of N.H." and "The Journal de Conchyliologie" of the same nominal date, but whereas the "Journal" rarely appears till from six weeks to two months after date, the English Magazines are always published a few days before date. Both Mr. Smith and Prof. Mousson could very well afford to dispense with whatever honor may be considered to arise from having their names attached to this shell, we have, therefore, no hesitation in pointing out what we believe to be the correct state of the case.

E. New Zealand has hardly answered to the expectations formed of it. Woodward says that it is "rich in land shells." If so, it is strange that scarcely half as many species have been found as in New Caledonia. *Nanina* are tolerably numerous, *Paryphanta* 16, *Thalassia* 7. There are 20 species of *Charopa*, which may be considered as the characteristic group. Two species

have been referred to *Rhytidia*, 1 to *Laema*, and 1 to *Dercasina*. The most interesting feature in the fauna is perhaps the presence of 2 species of *Platostylus*, of the typical New Caledonian section. There is also 1 *Balea*. The operculates are very few, *Diplommatina* 1, *Realia* 6, and *Cyclophorus* 2.

F. *Auckland Islands* possess only *Vitrina* 1 and *Thalassia* 2.

We have now concluded our survey of the geographical distribution of the Mollusca of the Old World, and pause for the moment. Should this effort be favorably received, it is our intention, after a short delay, to complete our task by a similar sketch of the general features of American Molluscan life. We are aware that there must be many deficiencies and errors in any such attempt, and shall always feel grateful for any information that may enable us to issue supplementary notes making good such deficiencies or correcting such errors. We will only add, in concluding this first part, that we have intentionally limited it to that portion of the extra-marine mollusca to which we have more specially attended; and we are quite conscious that, to complete the subject, the naked molluscs and the fresh-water species should likewise be included. The latter we may undertake some time; as to the slugs we confess we share in Dr. Jeffreys' aversion for them.

NOTE.—It may be proper to add, that the portion of this paper referring to the Palaeartic Province was written before the publication of Dr. Kobelt's second supplement to his catalogue. Fully recognizing the importance of the views he has therein expressed, we have thought that it would be more satisfactory to both for our paper to be published as it was originally written, and we have consequently made no alteration in it.

A LIST OF SHELLS TAKEN AT GUERNSEY, SARK,
AND HERM,* IN SEPTEMBER, 1877.

By A. H. COOKE, of King's College,
And H. M. GWATKIN, M.A., of St. John's College, Cambridge.

[NOTE.—Where the particular island is not specified, Guernsey is always referred to.]

PISIDIUM NITIDUM, *Jenyns*. Wet ground in a meadow near Cobo ; common.

PISIDIUM ROSEUM, *Scholtz*. In a small pond by the roadside, near the harbour at Sark ; not common.

HYDROBIA VENTROSA, *Mont.*, var. **ELONGATA**. Arnold's pond ; very abundant and fine.

PLANORRIS SPIRORBIS, *L.* Dry ponds near Mt. Crevel Tower, and ditches near Cobo ; common. Very abundant near Ivy Castle.

PLANORBIS VORTEX, *L.* Only a few specimens in small ditches at Cobo.

LIMNÆA PEREGRINA, *Müll.*, var. **SUBMARITIMA**. Generally distributed in ponds and ditches near the sea shore, at Guernsey only ; always dwarfed. It does not seem to occur at Sark.

LIMNÆA PALUSTRIS, *Müll.* Small streams and ditches throughout Guernsey, e.g., Fermain Bay, The Vale, &c. Not very common.

LIMNÆA TRUNCATULA, *Müll.* Ditches at Cobo ; rare.

LIMNÆA GLABRA, *Müll.* In ditches near Ivy Castle ; common.

* Our search at Sark and Herm only lasted about three days at each.

ANCYCLUS FLUVIATILIS, Müll. Very common in small streams in the south of Guernsey and at the Port du Moulin, Sark.

ANCYCLUS LACUSTRIS, L. Near Ivy Castle, Guernsey.

ARION ATER, L. Wet and damp places everywhere, especially in the valleys S. of Guernsey.

ARION HORTENSIS, Féér. Common under stones in Guernsey, Herm and Sark.

LIMAX MARGINATUS, Müll. Very common under large stones, generally distributed.

LIMAX FLAVUS, L. With the last, but not so common, and only in Guernsey and Sark.

LIMAX AGRESTIS, L. In most places; very common.

LIMAX MAXIMUS, L. Guernsey and Sark only; not common; with *L. marginatus* and *flavus*.

SUCCINEA PUTRIS, L. Moist places in Guernsey and Sark; very abundant.

VITRINA PELLUCIDA, Müll. Ditches at Vazon Bay; not at all common.

ZONITES CELLARIUS, Müll. Shady and damp places everywhere, abundant and very large. The finest were from Fort George, at the foot of the walls, and at Vazon Bay.

ZONITES ALLIARIUS, Müll. Under stones near the sea, on high downs as well as on flat ground in all the islands.

Var. VIRIDULA. Herm and south coast of Guernsey.

ZONITES NITIDUS, Müll. Wet ground near Cobo, with *Cochlicopa lubrica*, *Carychium minimum*, and *Vertigo antivertigo*; common.

HELIX ASPERSA, Müll. Common everywhere except in Sark.

Var. TENUIS. In Sark this variety, which is very common, seems to take the place of the type; it is particularly

abundant among stones on the downs, also at the south end of Guernsey. The descent from the type may, however, be clearly traced by specimens of various degrees of thinness.

Another variety occurs at Herm, of the same texture as the type, but dwarfed.

HELIX NEMORALIS, *L.* Common in all the islands, generally among stones near the sea.

Var. HORTENSIS, *Müll.* Pleinmont, Ivy Castle.

HELIX HISPIDA, *L.* Everywhere common. A curious variety occurred at Herm, in which the suture of the last whorl was deeply channelled near the mouth.

Var. SUBGLOBOSA. Fermain Bay and the woods above.

HELIX LIVICATA, *Michaud*. Downs on the S. Coast of Sark and Guernsey, also at the E. of Guernsey, and at Herm, local but abundant in suitable places; always near the sea. The last two localities are, we believe, new.

HELIX PISANA, *Müll.* Vazon Bay, Guernsey. Abundant and decidedly large.

HELIX VIRGATA, *Da Costa*. Most abundant on sandy flats to the N. of Guernsey and at Herm. At Sark only on the hill just above the harbour.

HELIX CAPERATA, *Mont.* Generally distributed; most common on the downs to the S. of Guernsey.

HELIX ROTUNDATA, *Müll.* All the islands; common under very large stones.

HELIX PULCHELLA, *Müll.* Guernsey only; local and rather scarce; most plentiful in St. John's churchyard; also in wet ground at Cobo and Vazon Bay.

HELIX AVUTUS, *Müll.* In the same localities with *Helix virgata* and equally abundant.

PUPA UMBILICATA, *Drap.* Common in all the islands, close to the sea as well as inland.

PUPA MARGINATA, *Drap.* Under stones at Vazon Bay; rare.

VERTIGO ANTIVERTIGO, *Drap.* Marshy ground at Cobo and Vazon Bay, with *Carychium minimum*, common; also in wet hollows on the cliffs above Moulin Huet. [Jeffreys has the obvious misprint, B. 0.6 for 0.06].

BALEA PERVERSA, *L.* Walls south of St. Peter's Port only; local but very abundant.

CLAUSILIA RUGOSA, *Drap.* Abundant everywhere in Guernsey; also in Sark.

COCHLICOPA LUBRICA, *Müll.* Common in all the islands, particularly in wet ground, at the roots of grass, at Cobo and Vazon Bay; also in the Seigneurie grounds, Sark.

CARYCHIUM MINIMUM, *Müll.* Wet meadows to the N. and W. of Guernsey; not uncommon, but of small size.

ANOMIA EPHIPPİUM, *L.* From low-water mark to 20 fathoms, on every part of the coast; common, but mostly young.

Var. ACULEATA. With the type, but not so abundant.

Var. CYLINDRICA. One specimen only, at Herm.

ANOMIA PATELLIFORMIS, *L.* With the last species, particularly at Bordeaux Harbour, but not nearly so common.

PECTEN PUSIO, *L.* Dredged in 20 fathoms off St. Peter's Port.

PECTEN VARIUS, *L.* Under stones at low-water mark, and to a considerable depth; common, but usually small.

PECTEN OPERCULARIS, *L.* Most abundant in about 10 fathoms, just outside St. Peter's Port Harbour.

MYTILUS EDULIS, *L.* Not common; it occurs generally as the variety *incurvata*.

MYTILUS BARBATUS, *L.* On the roots of Laminariae, thrown up on all parts of the coast.

MYTILUS ADRIATICUS, Lam. Rather common in gravelly shell-sand, in 15-22 fathoms, off the E. of Guernsey.

MODIOLARIA DISCORS, L. With *Mytilus barbatus*, at the roots and on the stalks of seaweed.

NUCULA NUCLEUS, L. Gregarious and exceedingly common, in shell sand (22 fathoms) off St. Peter's Port.

PECTUNCULUS GLYCYSMERIS, Linn. Low-water mark at Herm, in gravel, and in 18 fathoms, two miles E. of Guernsey.

ARCA LACTEA, L. Under stones at low-water mark of spring tides, at Herm, Bordeaux Harbour, &c., dredged at a considerable depth.

MONTACUTA SUBSTRIATA, Mont. On the spines at the ventral end of *Spatangus*, at Herm, in sand at extreme low water mark. As a rule there were never more than two specimens on each *Spatangus*, and always exactly in the same place.

LASEA RUBRA, Mont. All the coasts, very common; with *Littorina neritoides*.

Var. PALLIDA. Gouliot Caves, Sark.

AXINUS FLEXUOSUS, Mont. Valves only, in the shell sand, off Guernsey.

CARDIUM TUBERCULATUM, L. One specimen only, in mud in St. Peter's Port Harbour.

CARDIUM NODOSUM, Turt. In deep water south of Castle Cornet; not abundant.

CARDIUM EDULE, Linn. Herm.

CARDIUM NORVEGICUM, Speng. Herm, at extreme low water mark, in sand and sandy mud.

CIRCE MINIMA, Mont. Shelly gravel, east of Guernsey in 15-22 f., not common.

VENUS EXOLETA, L. In gravel at low water mark, Herm; abundant and large; also at Cobo.

VENUS FASCIATA, *Da Costa*. In sand and gravel at low water mark, Herm; common.

VENUS VERRUCOSA, *L.* Common everywhere, among rocks and small stones at low-water mark; it is eaten by the fishermen at Guernsey.

VENUS OVATA, *Penn.* Low-water mark at Herm and Bordeaux Harbour (single specimens); gregarious and very abundant in shell sand, $\frac{3}{4}$ -mile off Fort George, in 22 f., with *Nucula nucleus*.

TAPES AUREUS, *Gmel.* Only a few specimens occurred at Herm and St. Peter's Port Harbour.

TAPES VIRGINEUS, *L.* Common everywhere, in gravel and sand; often beautifully marked.

*Var. *SARNIENSIS.* St. Peter's Port Harbour, &c.

LUCINOPSIS UNDATA, *Penn.* One specimen only, at Cobo.

TELLINA CRASSA, *Gmel.* Dead (but fresh) shells only, at Herm; common.

TELLINA SQUALIDA, *Pult.* Herm, in sand; rather rare.

TELLINA DONACINA, *Liñn.* Dead (but fresh) shells only, at Herm; not uncommon.

PSAMMOBIA TELLINELLA, *Latr.* In gravel at extreme low-water mark, Herm; not common.

PSAMMOBIA VESPERTINA, *Chem.* In gravel and sand on all the coasts; common and often very large. In a bed of gravel a few yards square at extreme low-water mark at Herm there were taken with this species: *Venus fasciata*, *V. verrucosa*, *V. exoleta*, *Pectunculus glycymeris*, *Psammobia tellinella*, and *Cardium Norvegicum*.

DONAX POLITUS, *Poli.* In pure sand at extreme low-water mark of spring tides, Herm; with *Mactra glauca*, beautifully marked and rather rare.

* Sarnia is the ancient name of Guernsey.

MACTRA SOLIDA, *L.* In sand, Herm, and dredged off Guernsey; common.

MACTRAGLAUCA, *Born.* In pure sand, Herm, at extremely low tide; very rare and difficult to obtain.

LUTRARIA ELLIPTICA, *Lam.* Herm, in muddy sand.

LUTRARIA OBLONGA, *Chem.* With the last.

SOLECURTUS CANDIDUS, *Ren.* One specimen only, at Herm.

SOLEN SILIQUA, *L.* Common in sand and sandy mud on all the coasts.

PANDORA INAEQUIVALVIS, *L.* L'ancresse Bay only; not common.

COCHLODESMA PRÆTENUE, *Pult.* Dead but perfect specimens, at Herm.

SAXICAVA RUGOSA, *L.* At the roots of Laminariae thrown up at L'ancresse Bay.

CHITON FASCICULARIS, *L.* Deep water off Guernsey; only one or two specimens.

CHITON DISCREPANS, *Brown.* Under large stones at all parts of the coast, sometimes very large and finely marked.

CHITON CANCELLATUS, *G. B. Sowerby.* With *C. cinereus*, but much less common.

CHITON CINEREUS, *L.* Very common at low-water mark, and on a shelly bottom off Guernsey.

CHITON MARGINATUS, *Penn.* Fairly abundant everywhere.

CHITON LÆVIS, *Mont.* One specimen only, Herm.

PATELLA VULGATA, *L.* Exceedingly abundant everywhere; at Herm, very large and strong.

Var. ELEVATA. Sark.

Var. PICTA. Sark and Guernsey; not common.

Var. INTERMEDIA. East coast of Guernsey and Sark; the latter specimens are very fine.

Var. DEPRESSA. Abundant everywhere.

HELCION PELLUCIDUM, *L.*, var. *LEVIS*. All parts of the coast, on Laminariæ at low water.

TÈCTURA VIRGINEA, *Müll.* Under stones at low water all along the east coast, and at Herm; common.

Var. CONICA. Deep water off Guernsey.

EMARGINULA FISSURA, *L.* Low water mark at Bordeaux Harbour, and elsewhere.

EMARGINULA ROSEA, *Bell.* With the last, but more abundant and more widely distributed; very common on shells and stones in 15 f., off St. Peter's Port.

FISSURELLA GRÆCA, *L.* Low water mark at Bordeaux Harbour.

CALYPTREA CHINENSIS, *L.* Abundant from low water mark of spring tides (Cobo, St. Peter's Port Harbour, &c.) to 22 f. off Guernsey.

HALIOTIS TUBERCULATA, *L.* Abundant under large stones on all the coasts.

TROCHIUS MAGUS, *L.* Very common on muddy-gravel at low water mark, at most places. Specimens from deep water are much thinner and more angulated.

Var. ALBA. Cobo.

TROCHUS TUMIDUS, *Mont.* Rather common in 15–22 f., off St. Peter's Port.

TROCHUS CINERARIUS, *L.* Abundant everywhere.

TROCHUS UMBILICATUS, *Mont.* Excessively abundant everywhere.

TROCHUS LINEATUS, *Da Costa.* On large rocks in all the islands, very local, but rather common. Large specimens are sometimes rather scalariform. It is sold in the market at Guernsey.

TROCHUS MONTACUTI, *Wood*. With *Trochus tumidus*, but not nearly so common.

TROCHUS STRIATUS, *L.* On *Zostera* near low-water mark ; local, but very abundant off the Glatney Esplanade ; the largest are in 6-8 f. near the mouth of St Peter's Harbour.

TROCHUS EXASPERATUS, *Pnn.* On *Zostera* and *Fuci*, at low-water mark ; Bordeaux Harbour, Herm ; abundant.

TROCHUS ZIZYPHINUS, *L.* Common everywhere, under rock ledges and stones. A variety from deep water is, like *Trochus magus*, much thinner and more sharply cut.

PHASIANELLA PULLA, *L.* On *laminariæ*, (L'Ancresse Bay), under stones (Herm) ; 15-20 fathoms off St. Peter's Port ; common.

LITTORINA OBTUSATA, *L.* Everywhere, on *fuci*.

LITTORINA NERITOIDES, *L.* On all the rocky coasts.

LITTORINA RUDIS, *Maton.* Abundant.

Var. SAXATILIS. On rocks everywhere ; another common variety exhibits black bands on a white ground, while a third, found at Sark, is a bright red colour.

RISSOA STRIATULA, *Mont.* Dead specimens dredged in the shell sand.

RISSOA CANCELLATA, *Da Costa.* More common than the last.

RISSOA PARVA, *Da Costa.* Abundant everywhere on seaweeds at low water.

RISSOA COSTULATA, *Alder.* On *Zostera* at low water mark, with *Trochus striatus*.

RISSOA STRIATA, *Adams.* Under large stones between tide marks ; living with *Melampus bidentatus*, at Sark.

RISSOA CINGILLUS, *Mont.* With the last, but individually more abundant and widely distributed.

Var. RUPESTRIS. With the type.

HYDROBIA ULVÆ, *Penn*, and var. **OCTONA**. Arnold's Pond, Guernsey.

SKENEÀ PLANORBIS, *Fabr.* Port du Moulin, Sark.

SCALARIA CLATHRATULA, *Adams*. Fresh dead specimens in the shell sand east of Guernsey.

EULIMA INTERMEDIA, *Cantr.* Muddy sand and gravel off St. Peter's Harbour; rare.

NATICA CATENA, *Da Costa*. In sand at low water mark, Herm. The fishermen call it "silver shell" and consider it rather a rarity.

NATICA ALDERI, *Forbes*. With the last, but more abundant.

ADEORBIS SUBCARINATUS, *Mont.* In fine shell sand, 22 f., off Port George; not common.

LAMELLARIA PERSPICUÀ, *L.* On the roots of *Laminariae* thrown up at L'Ancresse Bay; also found at Bordeaux Harbour, and dredged on sea weeds in 15 f. outside St. Peter's Harbour.

CERITHIUM RETICULATUM, *Da Costa*. At the roots of *Laminaria bulbosa*, Herm; low-water mark, on stones in rock-pools at Bordeaux Harbour; not common.

CERITHIUM PERVERSUM, *L.* Fresh dead specimens in the shell sand off St. Peter's Port.

PURPURA LAPILLUS, *L.* Very abundant everywhere; a variety approaching to the var. (3) *minor* of Jeffreys occurred on rocks at Moulin Huet.

BUCINUM UNDATUM, *L.* Only two living specimens: one at low-water at Cobo, the other dredged off St. Peter's.

TRITON CUTACEUS, *L.* One deal and worn specimen from the beach at Herm.

MUREX ERINACEUS, *L.* Abundant everywhere.

MUREX ACICULATUS, *Lam.* On all the coasts, under stones at low-water mark; very common. The shell is generally almost hidden by a species of *Melobesia*.

Var. BADIA. In 20 f., off Fort George.

LACHESIS MINIMA, Mont. With the last, at Herm; rare.

TROPHON MURICATUS, Mont. In 15-20 f., off St. Peter's Port; not common.

NASSA RETICULATA, L. In sand at low-water mark, Herm only; local and not common.

NASSA INCRASSATA, Ström. On all the coasts, with *Murex aciculatus*; common.

DEFRANCIA GRACILIS, Mont. Off St. Peter's Port in 15-20 f.; rare.

DEFRANCIA LINEARIS, Mont. Low-water mark at Herm, with *Lachesis minima*; rare.

MARGINELLA LÆVIS, Don. A single specimen, dredged off St. Peter's Port.

CYPRÆA EUROPAEA, Mont. Low-water mark; almost everywhere, e.g., Gouliot Caves, Sark; Bordeaux Harbour, and Herm; rather common.

SCAPHANDER LIGNARIUS, L. Low-water mark of spring tides, in muddy sand, St. Peter's Port. This locality will confirm Dr. Landsborough's account as quoted in Jeffreys.

MELAMPUS BIDENTATUS, Mont. Under stones near high-water mark, west coast of Sark; local, but very abundant.

MELAMPUS MYOSOTIS, Drap. Extremely abundant and of large size; in a tidal ditch, Cobo.

OTINA OTIS, Turt. In caves and on rocks near high-water mark, at Sark; gregarious and very abundant.

Var. CANDIDA. With the type.

TRIOPA CLAVIGER, Muller. A few found at Herm.

ELYSSIA VIRIDIS, Montagu. With *Triopa claviger*.

We have been careful, in drawing up the above list, to confine the catalogue almost entirely to shells taken in a living state—cases of divergence from this rule being invariably specified. Otherwise the list might have been considerably enlarged. At the same time, there are several other Land and Fresh-water Shells known to inhabit the islands, which we were not fortunate enough to obtain on this occasion. *Helix aculeata*, for instance, is found in Guernsey, and so are *Sphaerium corneum* and *Sphaerium lacustre*, while *Testacella Haliotidea* occurs abundantly both at Guernsey and Sark.

Conspicuous by their entire absence are *Helix rufestris*, *H. sericea* and *H. rufescens*. Not a single specimen of the common shore periwinkle (*Littorina littorea*) occurred to us, though we are assured that it has been found at Guernsey. The comparative scarcity, too, of *Buccinum undatum* reminds one of the more southern latitude of these islands.

A few words may here be added with respect to *Helix pisana*. It was not till a fortnight after we discovered this shell at Vazon Bay that we learned, by the receipt of the *Q. J. C.* for August last, that we had been anticipated by Mr. G. S. Tye, and we may take this opportunity of confirming his account in most of the material points. One point of difference, however, is this, that whereas Mr. Tye had some difficulty in finding full grown specimens, we could scarcely find any that were not full grown. Perhaps, however, our searching at different seasons of the year may account for this divergence. Individual specimens, again, struck us as being extremely large, while to Mr. Tye they seemed smaller than usual.

It of course occurred to us at once that so conspicuous a shell as *Helix pisana* could not possibly be indigenous on an island which had been the home of so distinguished a conchologist as Dr. Lukis. Moreover—and here our conclusions differed entirely from those of Mr. Rimmer given in the *Q. J. C.* last November—it seemed probable that the introduction was *not* of very recent date, first, from the extent of ground (at least half-a-mile) over which the shell was found; secondly, from our finding fragments of old and worn shells under large and heavy stones, which evidently had not been moved for some time. We are aware that the locality of Mr. Rimmer's find was the Vale Castle, while ours was Vazon Bay, but still, as will afterwards appear, the same reasoning applies to each. Accordingly we wrote to Dr. Lukis' daughter, Mrs. Colings, of Sark, her self a great authority on all matters of natural history, to ask if she could give us any information as to the introduction of this snail. She replied as follows:—" *Helix pisana* " was introduced in 1860, from Jersey. My brother was staying

"there for some time, and brought over a number which he
"divided into little colonies : one at Vazon Bay, another at the
"Vale Castle, and about a dozen and a half which he sent me to
"try in Sark. I put them on the right bank, going down to the
"Port du Moulin, and for a few years after occasionally found
"a shell or portions of shell near a stone, where a thrush or black-
"bird had had a meal. Thus I fear they have all vanished, for it
"is now some years since I have seen any. . . . My brother
"died in 1863."

This at once settles the question, for it is obviously unnecessary to assume a second introduction since 1873, simply because Mr. Rimmer did not find the shell at Vazon Bay in that year. No doubt its range was much less extensive then than it is now. It is noticeable too that the capabilities of the new colonies for sustaining life varied directly with the exposed nature of their situation. That at Sark, on rather high and rocky ground, probably never took root at all; that at the Vale Castle, in spite of its north-easterly outlook, was on a far more congenial soil, and consequently survived until 1873 or later; while that at Vazon, planted on low lying ground, and facing the N.W. has lived and flourished, although doubtless, like Dr. Jeffreys' importations to Swansea, after the parent stock had died out, the new brood took some time to establish itself permanently.

It only remains to inform Conchologists, in case they are at any future time perplexed by finding dead shells of *Helix pomatia* at Guernsey, that Dr. Lukis tried the same experiment with that shell as he did with *Helix pisana*, but apparently without the same success.

HELIX PISANA. MULLER.

By G. SHERRIFF TYE.

Mr. Richard Rimmer's courteous observations upon my notes on this mollusk were read by me with much interest, and I accord to him with pleasure all the credit belonging to him as being the first to observe this species in Guernsey, as I, like him, set the truth before any personal vanity.

No doubt Mr. Rimmer's surmise is correct as to the introduction of *pisana* to Vazon Bay, but it must have been soon after his visit, as many of the shells would complete their growth in the season in which I saw them, and according to my own observations, it is usually in the third year of their growth that our larger mollusks finish their shells.

It would be well if the person who introduces an animal or plant into a new locality would record the fact in one of our natural history periodicals, as it would greatly help those of us who wish to arrive at a knowledge of their natural distribution.

Mr. Rimmer's explanation of the probable cause of the congregation of adult shells is doubtless right.

I do not think aspect would prevent the successful establishment of *H. pisana* on our coast, if the parents were introduced in early summer before breeding commenced. Its Irish habitat is an *Eastern* one.

H. pomatia and *H. cantharina* find no difficulty in accommodating themselves to Yorkshire.

It would be interesting to ascertain if it could be successfully introduced into some *inland* station in this country.

The discovery of Dr. Gwyn Jeffreys' colony at Swansea is noteworthy. In speaking of it Mr. Rimmer says the variety *alba* seemed to be the most plentiful, does he not mean the creamy white variety? not *alba*, which is, as I pointed out, a *snowy opaque white* with (Mr. Shuttleworth says sometimes without) translucent markings.

Dec., 1877.



OCCURRENCE OF *GADINIA RETICULATA*, Sow, IN
SOUTH-EASTERN POLYNESIA.

By ANDREW GARRETT.

Having collected a number of examples of a species of *Gazinia*, in the Society and Paumotu Islands, the first indication of the genus in Polynesia, I distributed them among my correspondents, labelled *G. varia*, Nobis, MS. Having received a fine series of Sowerby's *reticulata*, collected in California, I cannot detect after a critical comparison the slightest difference in the specimens from the two localities, they agreeing precisely in form, texture, color and sculpture. Our shells were found adhering to the under side of huge blocks of dead coral on the outer reefs, where they were continually submerged except at extreme low water at the new and full moon.



OCCURRENCE OF *CREPIDULA ACULEATA*, GMEL.,
IN THE MARQUESAS ISLANDS.

By ANDREW GARRETT.

About a year ago, while exploring the Marquesas, I remarked this cosmopolitan species cast up on the beaches in great numbers, though seldom in good condition. It is probably a denizen of deep water, as I searched in vain for living examples.

It also occurs at the Sandwich Islands, where I found a few beach-worn specimens. It is recorded from New Zealand, Australia, India, Mau itius, W. Indies, Japan, Panama and California. I have had no opportunity of comparing our shells with West Coast examples.

Having lately received perfect specimens of *Hipponyx barbatus*, L., and *H. antiquatus*, L., from the coast of California, I failed to discover even a single varietal character to separate them from Polynesian examples. The former species is not uncommon in all the Eastern Polynesian Islands, and *antiquatus*

occurs at all the groups east and west, though of smaller size than the west coast shells. It is also said to be found at Panama, Peru, W. Indies and Seneg. *Hippomyx feliacens*, "Quoy et Gaimard, Zool. Voy. Astrolabe, Pl. 72, fig. 41—45," is probably the same, it was obtained at Guam, where I found all the mollusca of the Polynesian type.

July, 1877.

ALLIANCE OF THE GENERA *STREPTAXIS* AND *ENNEA*.

By J. S. GIBBONS, M.B.

In Paetel's Catalogue *Streptaxis* is placed in a group with *Ennea*, *Streptostele* and *Celiaxias*. Mr. Bland, from a consideration of their teeth, &c., also places the two first together; an arrangement now adopted by most conchologists.

It is difficult to understand on what grounds *Streptaxis* could have been linked with *Helix* and *Ennea* with *Pupa*. It must certainly have been done in ignorance of the animals.

The two genera (*Streptaxis* and *Ennea*) resemble each other most closely in shell, animal, and habits.

In both, the shell is of the same semi-transparent, pearly lustre, allowing the retracted animal to be clearly distinguished; the shape, too, of the shells is not dissimilar, except that in *Streptaxis* the whorls are not symmetrical. The animal in both genera is singularly alike and very distinct from that of all others; alike in shape, alike in having the tentacles a beautiful deep vermillion color, and in having the foot a rich chrome yellow. In both the animal is quick, irritable, timid, and all the species love to hide themselves under dead leaves and decaying rubbish under trees and at the verge of forests. No species of either genus ever suspends itself by dried mucus or attaches the aperture of its shell as do *Pupas* and many *Helices*.



NOTES ON THE GENUS *PARTULA*.

By C. P. GLOVNE.

Having in my collection a rather considerable number of species of *Partula*, received principally from Mr. Bland, of New York (including typical examples of many of Pease's species), and from the Museum Godeffroy, I have thought it desirable to examine those with a view to ascertain which of the so-called species ought to be allowed to stand, and which of them are, on the other hand, only synonyms or varieties. I suspected that many would be in the latter category, Pease having described new species in great profusion, so that, including those of which he had not seen the descriptions, Dr. Pfeiffer (whose loss all conchologists must deeply regret) enumerates about 140 different species in the last volume of his monograph.

As will be seen below, this expectation has been justified, and probably I might have been able still further to reduce the number if, instead of rarely possessing more than three specimens of each so-called species, and often only one or two, I had had extensive suites at my disposal so as to show transitions.

The following are my remarks: *Partula sinistrorsa*, Pse., is synonym of *P. amabilis*, Pfr., which latter hardly differs from *rubescens*, Rv., except in color.

P. crassa, Pse., is very near but has a denticle.

These species form a natural group with *P. otaheitana*.

P. attenuata, Pse., 1871 (Mus. Godeffroy) = *P. gracilis*, Pse., 1866.

P. alternata, Pse., is synonym of *P. vexillum*, Pse.; the only difference is in the markings, which are very variable.

P. vexillum, Pse., *bilineata*, Pse., and *trilineata*, Pse., are very near, and probably will eventually be united by intermediate gradations.

P. simplaria, Morelet, is synonym of *P. varia*, Brod.

P. cognata, Pse., is intermediate between *varia* and *rosea*, Brod. Probably the three will eventually be united.

P. lignaria, Pse., synonym of *P. affinis*, Pse.

P. Huahineensis, Garrett = *P. lugubris*, Pse., and *P. pulchra*, Pse., is only var. *minor* of the same.

P. globosa, Pse. = *P. Hebe*, Pfr.

P. approximata, Pse., MS. = *imperforata*, Pse.

P. rustica, Pse. = *P. crassifabris*, Pse.

P. abbreviata, Mousson, seems the same as *solidula*, Rv.

P. compacta, Pse. = *callifera*, Pfr., according to a specimen identified by Mr. Sowerby at the British Museum.

P. gracilis, Pse. = *attenuata*, Pse.

P. simulans, Pse. = *striolata*, Pse.

P. subgonochila, Mous. I cannot see the difference between this and *P. gonochila*, Pfr.

P. terrestris, *variabilis* and *protea*, Pse., seem distinct and belong to the same group as the well-known *P. faba*, Martyn.

There are many species of which I have never seen specimens, and I doubt not that among them further rapprochemens might be made.

C. P. G.

Dec. 12th, 1877.



ON CERTAIN SPECIES OF *LITTORINA*.

By J. S. GIBBONS, M.B.

In tropical and subtropical regions certain species of *Littorina* are confined to water more or less brackish, being incapable of living in pure salt water.

I have met with three of these and in each case they have been distinguished from the truly marine species by the extreme (comparative) thinness of their shells and by their coloring being richer and more varied; they are also usually more elaborately marked. They are to be met with under three different conditions, viz., in harbours and bays where the water is salt with but a slight admixture of fresh water; in mangrove swamps where salt and fresh water mix in pretty equal volume; and lastly on dry land, but near a marsh or the dry bed of one.

L. intermedia, Rve., a widely-diffused E. African shell, attaches itself by a thin pellicle of dried mucus to grass growing by the margin of slightly brackish marshes near the coast, resembling in its mode of suspension the Old World *Cyclostomas*. I have found it in vast numbers in situations where, during the greater part of the year, it is exposed to the full glare of an almost vertical sun, its only source of moisture being a slight dew at night time. The W. Indian *L. angulifera*, Link, and a beautifully colored E. African species (*L. carinifera*, Juke?) are found in mangrove swamps, &c., they are however less independent of salt water than the last.

Notwithstanding that the true marine species are thicker than those found in brackish water, the latter become more solid as the water they inhabit becomes less salt. This is curious and the reverse of what one would expect. It is, however, undoubtedly the case, as I have often satisfied myself. *L. angulifera*, e.g., is unusually solid and heavy at Puerto Plata (S. Domingo) among

mangroves, where the water is in a great measure fresh, while at Havannah and Colon, when it lives on stakes in water but slightly brackish, it is thinner and smaller and also darker colored. Again the specimens of *L. intermedia* on stakes at the mouth of the Lorenzo Marques River, Delagoa Bay, are much smaller, darker, and more fragile than those living on grass a few hundred yards away.

I have sometimes thought the explanation of this might be that those living furthest from the influence of the sea get their salt water only at high spring tides, and are therefore exposed to greater physical changes than the others dwelling by water in direct communication with the sea. And yet if such were the case, one would expect a coarseness and irregularity in the growth of the former which does not occur. I must therefore be content with recording the results of observation.

Jan. 4th, 1878.

ABNORMAL FORM OF
CYLINDRELLA RAVENI, BLAND.

By J. S. GIBBONS, M.B.

Among some specimens of the above species collected on the Island of Curaçao, I found a very curious monstrosity—the shell (empty when I picked it up) possessing two apertures placed almost back to back—a kind of Mollusean “Two-headed Nightingale.”

Originally the shell was undoubtedly an ordinary form, but for some reason or other it has formed a second aperture, about one-third of a volution nearer the apex, the canal of the portion of whorl beyond being obliterated by the columellar side of the new orifice.

Probably a hole was accidentally broken in the body-whorl, and the animal, instead of closing it, converted it into a new aperture, thereby somewhat shortening the inhabited part of its shell.

Jan. 4th, 1878.



DESCRIPTION OF TWO NEW GASTEROPODS.

By WILLIAM DOHERTY.

University of Cincinnati, U.S.A.

Somatogyrus trothis, Doherty. (Plate IV., fig. 1.)

SHELL globosely ovate, rather heavy, yellowish-green; *spire* conical, elevated for the genus, nearly as long as the aperture; *suture* deeply impressed; *whorls* four, rapidly increasing, with fine lines of growth, last year's growth somewhat dilated at its junction with that of the previous year; last whorl constricted near peristome, forming an obliquely-impressed scar above, and at the base below the closed umbilicus, a deep impression which sometimes indents the peristome; *aperture*, broadly ovate, obtusely rounded below; *peristome* somewhat shouldered above, slightly angulated below at its union with the rounded columella.

Length 5 mill., diameter 4 mill.

Found on stones in the Ohio River, above the mouth of the Five-mile Creek, Campbell County, Kentucky; also on leaves in Five-mile Creek.

Specimens are in the cabinet of the Philadelphia Academy of Sciences, and in those of Prof. A. G. Wetherby and Dr. James Lewis, as well as in my own.



Cionella (Zua) Morseana, Doherty. (Plate IV., fig. 2.)

SHELL cylindrical, slender, thin, transparent, highly polished, reddish-brown, with slight, irregular lines of growth; whorls $5\frac{1}{2}$, flattened, the last nearly one-third the length; suture little impressed; apex very obtuse; aperture oblong-ovate, widest near base; peristome scarcely thickened, reddish; umbilicus closed; columella perpendicular, meeting base of peristome at something less than a right angle.

Foot white, almost translucent; head grayish, with short tentacles.

Length 7 mill., sometimes more; diam. 2 mill. Aperture 2 mill. long.

Found in beds of leaves in woods, Kenton County, Kentucky, and Hamilton County, Ohio; solitary, rare.

It may be viviparous. In the winter it closes its shell with an opaque, white epiphragm, like that of *Helix profunda* or *H. pomatia*.

Differs in many respects from *C. subcylindrica*, L. The shell is longer, more slender, more cylindrical, the whorls flatter, the columella straighter, the apex and base more obtuse, the foot lighter, the shell darker and less opaque.

I take the liberty of naming this species after the distinguished American naturalist, Prof. Edward Morse.

Jan. 5th, 1878.





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2. *CIONELLA MORSEANA* DOHERTY. 1. *SOMATOGYRUS TROTHIS* DOHERTY
3. *PLANORBIS GIBBONSI* NELSON



DESCRIPTION OF A NEW SPECIES OF *PUPA*.

By CHAS. R. JUDGE.

Read before the Cincinnati Society of Natural History, Jan. 2nd, 1877.



Pupa Cincinnatiensis, nov. sp.

SHELL delicate, minute, shining, translucent, nearly colorless, smooth, very faintly marked by the striae of growth and by numerous microscopic wrinkles; apex obtuse; whorls $4\frac{1}{2}$ to 5, convex, separated by a deeply impressed suture, aperture semi-oval, having in the right hand portion of the peristome a slight fold, slightly contracting the aperture at the margin; peristome simple, heavily thickened near the margin, the callus extending over the parietal wall; aperture contracted by five prominent denticles, seated on the callus, one prominent on the parietal wall, two on the columella, the lower being the smaller of the two, and two on the other portion of the peristome, more deeply seated in the throat, and occasionally one or two very minute rudiments on the peristome.

Length 1.56 mill., diam. 8.4 mill.

This shell is found on both sides of the Ohio River, near Cincinnati, stationed in deep beds of damp leaves, in woods,

somewhat close to the ground. It may most easily be mistaken for *Pupa pentodon*, but is much smaller and proportionably broader and its aperture is obstructed by a less number of denticles than are usually seen in specimens of the latter species.

There are specimens in my own cabinet and in the collections of Jas. Lewis, M.D., Mohawk, N.Y., and of the Cincinnati Soc. of Nat. Hist.

REMARKS ON A DENTATE VARIETY OF *CONULUS FULVUS*, DRAP.

By WILLIAM DOHERTY.

University of Cincinnati, U.S.A.

The eastern part of the Union is the peculiar habitat of gastrodont or internally dentate species of *Zonites*, and in a gastrodont variety of *Zonites (Conulus) fulvus*, Drap., recently found at several points near Cincinnati, we have an example of a widely distributed species, spread over all the northern parts of Europe, Asia, and America, assimilating in one portion of its range to the forms prevalent there.

The "teeth" are placed as in *Z. multidentatus* Binn., and vary from one slight, shapeless roughening of the inner surface of the outer whorl, to four large, elongate teeth, radiating from the umbilicus like the spokes of a chariot-wheel. As is usual with gastrodont snails, these teeth attain their greatest development in the half-grown shell. From the chief locality of this variety I obtained 39 young *fulvi*, of which 18, or nearly half, were more or less dentate, while of 17 adult *fulvi* from the same place, one had in the next to the last whorl a single tooth much flattened and eroded, while all the others were toothless. Hence I suppose that the teeth are gradually worn away by the motions of the

animal. In *Z. multidentatus*, rows of teeth appear at an early age, and as often as the shell grows a quarter of a whorl, a new row is produced while the earliest is worn away. So the shell grows to maturity, always having three or four rows of denticles. In this variety of *fulvus*, however, this process seems to cease long before the shell reaches maturity, and the last whorl is thus left without teeth.

The cause of these denticles can hardly be decided, but one may guess. I found a small, white, tender grub, which lives in beds of leaves and preys on small snails like *Zonites arboreus* Say., by entering the shell at its mouth and devouring the animal. The denticles may have been evolved as a protection against foes of this description, either by obstructing their entrance, or perhaps by wounding their bodies, which seems possible in the case of *Z. multidentatus* and *significans* Bland, and *Strobila labyrinthica* Say. The complicated lip apparatus of some of our *Helices* (as *H. auriculata* Say.) and *Pupas* (as *P. contracta* Say.) possessed only by the mature shells seems likewise a defence against external enemies. In the gastropod snails the growth of the shell seems slow, and the mature state short, as shown by the greater frequency of young shells. Indeed, this and the fact that specimens of *Z. fulvus* in my possession laid eggs when wanting a whole whorl of maturity, leads one to believe that the last whorl, like white hair in man, is attained only in old age, and that teeth or folds at the completed peristome would thus protect comparatively few individuals. Under these circumstances it is not strange that internal denticles, present at all stages of growth, should have been evolved for the protection of this curious variety, which offers a fair example of a species in the course of development but not yet crystallized to a firm type, by the extinction of intermediate forms.

Jan. 20th, 1878.

DESCRIPTIONS OF NEW SPECIES OF *ACHATINA*.

By EDGAR A. SMITH, F.Z.S.

Zoological Department, British Museum.

The following interesting species form part of the National collection, which contains a very fine series of *Achatinæ*, comprising nearly all the described large African forms, with a very few exceptions.

Achatina albopicta.

Testa crassiuscula, acuminata ovata, saturate fusca strigis maculisque albis diverse picta; spira acuminata apice pallido, subobtuso; anfractus 7½ medioriter convexi, ubique granulati, granulis oblongis; sutura leviter obliqua anguste albo marginata; apertura elongate ovalis superne acuminata, perpendicularis, longitudinis testae ½ æquans, intus callo albo induta; columella aliquanto arenata, basi breviter truncata, callo albo usque ad marginem peristomatis exteriorem continuo amicta.
Long. 84 mill.; Diam. 37; apert. long. 43; diam. 22.

Hab. ? Probably African.

Shell rather solid and heavy, ovate, acuminate above or in the direction of the apex. The colors are about equally divided, and consequently the ground color may be termed either white or dark-brown; in the former case it would be streaked and blotched with brown and in the latter with white. The streaking and blotching are very irregular, but decidedly display a tendency for an oblique direction parallel with the lines of growth. Whorls 7½, rather convex, and ornamented over the entire surface with narrow, elongate granules, which like the coloring also follow the direction of the incremental lines or striae. The last whorl is not very ventricose, but extends or is produced some distance below the

truncated end of the columella. The aperture is about as long as half the entire length of the shell, of an irregular, elongate, oval form, acute superiorly, very white within, being covered with a thick, shelly deposit of that hue. The columella is only slightly arched, also clothed with a white callosity extending upwards over the whorl as far as the extremity of the outer lip. Its truncation is rather abrupt and narrow.

The nearest ally of this species appears to be *A. Kraussi*, Rve. It differs from it, however, in having a more elongate and acuminate spire, the more varied and irregular character of the blotching and the strongly marked granular sculpture.

Achatina zebroides.

Testa subsolida, ovata, alba, strigis angustis obliquis numerosis irregularibus rufo-fuscis ornata; spira conica apice albido obtuso; aufractus 7 convexi, superiores oblique striati et granulati, tres ultimi minus distincte granulati, ultimus sublevigatus; apertura ovata, superne acuminata, longit. totius $\frac{3}{2}$ paulo minor, intus alba, hic illuc strigis rufo-fuseis aliquanto pellucentibus; columella leviter arcuata alba, callosa, basi abrupte truncata; perist. simplex.

Long. 46 mill.; diam. 23. Apertura 23 long., $12\frac{1}{2}$ lat.

Hab. ? Africa probably.

Shell rather solid and heavy for its size, ovate, white, varied with numerous close set and slightly oblique reddish-brown stripes, which are rather regular and only slightly undulating; spire obtusely conical, white towards the apex which is rather rounded and not acute; suture but slightly oblique, crenulated; whorls 7 quite convex, the third and fourth from the nucleus ornamented with a close granulation, the granules being elongate; on the two succeeding whorls they are less conspicuous, and on the last

become almost obsolete; aperture small, not equalling half the entire length of the shell, within coated with a white opake enamel and streaked here and there rather indistinctly by the exterior brownish stripes; columella coated with a thin white callosity, which extends as far as the upper extremity of the outer lip; it is a little arcuated and rather abruptly but obliquely truncated at the basal end; peristome simple, regularly curved, and thin.

This species, of which I have seen only a single specimen, agrees in form very fairly with *A. porphyrostoma*, Shuttleworth, with the exception of the spire being a little less obtuse, and in coloration it reminds one very much of *A. Zebra*.

Achatina dimidiata.

Testa ovata, tenuis, levigata, superfice fusca parum nitida, inferne virescenti-flavescens polita; spira conica, apice obtuso; anfractus 6½-7, superiores convexiusculi lineis incrementi aliisque spiraliibus subrugose granulati, sutura crenulata sejuncti; ultimus magnus, ventricosus, superioribus levior, supra medium fuscescens, infra abrupte virescenti-flavus et levigatus; apertura verticalis, subovalis, supra acuminata, intus callo cæruleo-albo induta; columella subperpendicularis parum externe arcuata, rosco pallidissime tincta; peristoma tenue simplex, marginibus callo tenuissimo junctis.

Long. 80 mill.; diam. 39. Apert. long. 45, diam. 26.

Shell thin, light, divided into two differently colored portions, the upper section above the middle of the body-whorl being of a uniform dull-brown color and displaying very little gloss on the surface, the lower division is polished and greenish-yellow or olive, streaked here and there longitudinally with a darker tint. Whorls about seven in number, the upper ones moderately convex, and sculptured with somewhat coarse granulation, which is formed by

the strongly marked oblique lines of growth being intersected by less pronounced spiral striae; this granulous sculpture becomes almost obsolete on the upper half of the last volution and vanishes entirely below the middle. The aperture is large and occupies more than half the entire length of the shell; it is oval in form, acuminate above, and coated within with a bluish-white callosus deposit; columella nearly perpendicular, curved very slightly in an outward direction and tinted with a very pale shade of livid pink. It is abruptly truncated below and invested with a thin callosity, which extends over the oral side of the whorl and joins the thin periteme above.

Hab. Eastern Slope of the Drakensberg Mountains, at Lydenburg Gold Fields, Transvaal, South Africa.

The species is very readily distinguishable by the strongly contrasting colors of the upper and lower portions. This division of the shell by color into halves suggested the specific name which I have ascribed to it.

Achatina bisculpta.

Testa tenuis, ovata, superne acuminata, sub epidermide flavo-olivacea sordide albida vel cæruleo-alba, strigis angustis paulo undulatis rufo-fuscis varigata; spira subacute conica, apice pallido, fario, obtuso; sutura profunda, vix obliqua; anfractus 7½ perconvexi, conferte granulati, ultimus infra medium granulis minoribus ornata; apertura parva irregulariter ovalis, longit. totius ½ paulo superans, intus pallide cærulescens, strigis rufo-fuscis pellucentibus; columella in medio arcuata, inferne tortuosa, basi abrupte truncata, albescens.

Long. 46 mill.; diam. 25. Apertura 25 longa., 13½ lata.

Hab. South Africa.

Shell light and thin, ovate, acuminate above, clothed with a thin, yellowish olive epidermis, beneath which it is dirty or bluish-white, striped a little obliquely with narrow and slightly wavy reddish-brown streaks; suture almost horizontal, rather deep owing to the rotundity of the volutions; whorls $7\frac{1}{2}$, very convex, the four apical ones pale without stripes, all granulated, the granules on upper ones which constitute the spire rather coarse in close spiral series, the upper part of the body-whorl similarly granulated, the lower portion much more finely, the line of demarcation between the two kinds of granulation sudden and distinct. The mouth rather small, very irregularly oval, occupying a little more than half the entire length of the shell, dirty-white or bluish-white within, displaying the exterior reddish-brown striping; columella arched in the middle, tortuous below and abruptly truncated at the base, of a dirty white color and covered with a very thin callous, which extends over the whorl and joins the lip at its upper extremity.

This interesting species must not be mistaken for the young of *A. Welwitschi* Morelet, to which it bears some resemblance.

There are two specimens of it and apparently not quite adult. I imagine, however, that they would not grow much larger but no doubt would become somewhat more solid.

Achatina simplex.

Testa ovata, tenuis, pallide olivaceo fusca, nitida : spira emissa apice obtusa; anfractus 6½, convexi superne granulati inferne subleigalli, ultimus infra medium levigatus : sutura recte obliqua; apertura irregulariter ovata superne acuminata longit. tollit ½, subaequans, intus corubescens albida : columella contorta in medio arcuata, basi oblique breviterque truncata, alto tenui superne labro fundo involuta.

Exemp. max. Long. 50 mill.; diam. 26. Apertura 25 long. 16 lat.

Exem. alterum. Long. 39 mill.; diam. 22. Apertura 21 long. 12 lat.

Hab. Port Natal (Sutherland).

Shell rather thin, light ovate, clothed with shining olive-brownish thin epidermis, here and there streaked in an oblique direction with narrow stripes or lines of a deeper shade of the same colour; spire obtusely conical, terminated by a rounded, blunt apex; whorls $6\frac{1}{2}$ gradually increasing, sculptured by oblique lines of growth, which are granulated on the upper portion of the whorls; the granules are oblong and vanish almost entirely on the lower third part of the upper whorls, and are only traceable for a short distance below the suture on the body-whorl. The extreme upper edge of the whorl bordering the suture is pale and crenulated; aperture irregularly ovate, acuminated above and produced only moderately below the truncature of the columella, equalling about half the entire length of the shell, somewhat iridescent, within bluish or vinous white; peristome thin, simple, everywhere arcuate; columella well arched in the middle and tortuous beneath, oblique but narrowly truncate at the base, covered with a whitish enamel faintly tinged with pink, which extends in the form of a very thin layer over the whorl to the termination of the outer lip.

This species is very distinct from any other with which I am acquainted. It is remarkable for the simplicity of its coloring, the rotundity of the whorls, and its glossy surface. Several specimens were presented to the British Museum in 1860, by Dr. P. Sutherland, by whom they were collected at Port Natal whilst surveying that part of South Africa.

Achatina Transvaalensis.

Testa oblonga, tenuissima, pallide virenti-straminea; spira obtuse conica apice rotundata; anfractus 7½ perconvexi, sutura crenulata fere horizontali discreti, inconspicue oblongo-granulati, lineis

incrementi obliquis sculpti, ultimus infra medium haud granulatus; apertura parva, longit. totius $\frac{1}{2}$ paulo superans, intus albo diaphana; columella arcuatissima et torta, ad basin abrupte truncate albo marginata; perist. tenuissimum.

Long. 38 mill.; diam. 17. Apertura 17 longa., 9 lata.

Hab. Eastern Slope of the Drakensberg Mountains, at Lydenburg Gold Fields, Transvaal, South Africa.

Shell oblong, thin, pale greenish-straw color; spire bluntly conical, terminated by an obtuse apex; whorls $7\frac{1}{2}$, very convex, separated by a deep and almost horizontal suture, crenulated just beneath it and bordered by a very thin, yellowish line; the surface is everywhere (with the exception of the lower half of the body-whorl which is smooth) covered with oblong granules, which are not very observable to the naked eye; the lines of growth are distinct and a little obliquely inclined; the aperture is small, being less in length than half that of the entire shell and of a diaphanous whitish color within; columella very much arched in the middle, tortuous beneath, abruptly truncated at the base, and the edge coated with a thin, white enamel.

This species in texture and color resembles in a degree *A. natalensis* Pfeiffer, but its form is very different and the granulation rather finer. In shape and the proportion of the whorls it approximates *A. polychroa* of Morelet, but the volutions are much more convex and the columella is not straight.

Two specimens of this species and two of *A. dimidiata* have been liberally presented to the British Museum by Mr. G. B. Sowerby, jun.

Jan. 20th, 1878.

ANNOTATED CATALOGUE OF THE SPECIES OF *CONUS*,
COLLECTED IN THE SOUTH SEA ISLANDS.

BY ANDREW GARRETT.

On looking over my notes and Journals made during many years devoted to Conchological researches in the various South Sea Islands, I have selected and tabulated the following list of Cones collected in all parts of Polynesia, hoping it will not be devoid of interest to those engaged in elucidating the difficult problem of the geographical distribution of the mollusca.

It is worthy of remark that every species mentioned in the present list has been collected by the writer, so that the locations and range of each can be relied on as correct. Of course further research will increase the number of species, and prove that others have a more extended range than given in this Catalogue.

I have not attempted to elucidate the cause of variation, which, in many cases, is as great in the same group of Islands as in those species common to remote localities. Shells inhabiting Western Polynesia are most generally larger and firmer than Eastern Polynesian examples, but in some instances the contrary takes place.

In order to acquire a true knowledge of geographical distribution, local lists carefully tabulated will be of material aid in solving the problem. In future papers I purpose to catalogue other genera in the same manner.

			Viti Islands.	Tonga Islands.	Samoa Islands.	Kingsmill Isl's.	Caroline Islands.	Cook's Islands.	Society Islands.	Panmou Isl's.	Marquesas Isl's.	Sandwich Isl's.
36.	Conus	luteus, <i>Brod.</i>	...	...						
37.	"	legatus, <i>Lam.</i>	...	...						x x		
38.	"	lictor, <i>Boiv.</i>?	...	...	x							x
39.	"	magnificus, <i>Rve.</i>	...	...	x							
40.	"	magus, <i>Lin.</i> ...	...	...	x							
41.	"	marchionatus, <i>Ids.</i>	...	...	x					x		
42.	"	marmoreus, <i>Lin.</i> ...	...	...	x	x	x	x	x	x x	x	x
43.	"	miles, <i>Lin.</i> ...	...	...	x	x	x	x	x	x x	x	x
44.	"	miliaris, <i>Lin.</i>	...	...	x	x	x	x	x	x x	x	x
45.	"	millepunctatus, <i>Lam.</i>	...	...	x	x	x	x	x	x x	x	x
46.	"	minimus, <i>Lin.</i>	...	...	x	x	x	x	x	x x	x	x
47.	"	mitratus, <i>Brug.</i>	...	...	x	x	x	x	x	x x	x	x
48.	"	mustelinus, <i>Brug.</i>	...	...	x	x	x	x	x	x x	x	x
49.	"	nanus, <i>Brod.</i>	...	...	x	x	x	x	x	x x	x	x
50.	"	nocturnus, <i>Brug.</i>	...	...	x	x	x	x	x	x x	x	x
51.	"	nussatalla, <i>Lin.</i>	...	...	x	x	x	x	x	x x	x	x
52.	"	omaria, <i>Brug.</i>	...	...	x	x	x	x	x	x x	x	x
53.	"	panniculus, <i>Lam.</i>	...	...	x	x	x	x	x	x x	x	x
54.	"	pertusus, <i>Brug.</i>	...	...	x	x	x	x	x	x x	x	x
55.	"	praefectus, <i>Brug.</i>	...	...	x	x	x	x	x	x x	x	x
56.	"	pulicarius, <i>Brug.</i>	...	...	x	x	x	x	x	x x	x	x
57.	"	pusillus, <i>Chem.</i>	...	...	x	x	x	x	x	x x	x	x
58.	"	planorbis, <i>Born.</i>	...	...	x	x	x	x	x	x x	x	x
59.	"	parvus, <i>Pse.</i>	...	...	x	x	x	x	x	x x	x	x
60.	"	praetextbox, <i>Rve.</i>	...	...	x	x	x	x	x	x x	x	x
61.	"	quercinus, <i>Brug.</i>	...	...	x	x	x	x	x	x x	x	x
62.	"	rhododendron, <i>Couth.</i>	...	...	x	x	x	x	x	x x	x	x
63.	"	scaber, <i>Kien.</i>	...	...	x	x	x	x	x	x x	x	x
64.	"	solidus, <i>Sow.</i>	...	...	x	x	x	x	x	x x	x	x
65.	"	sponsalis, <i>Chem.</i>	...	...	x	x	x	x	x	x x	x	x
66.	"	stictatus, <i>Lin.</i>	...	...	x	x	x	x	x	x x	x	x
67.	"	Tahitensis, <i>Brug.</i>	...	...	x	x	x	x	x	x x	x	x
68.	"	terebra, <i>Born.</i>	...	...	x	x	x	x	x	x x	x	x
69.	"	tessellatus, <i>Born.</i>	...	...	x	x	x	x	x	x x	x	x
70.	"	toxig, <i>Lin.</i>	...	...	x	x	x	x	x	x x	x	x
71.	"	tulipa, <i>Lin.</i>	...	...	x	x	x	x	x	x x	x	x

				Viti Islands.
72.	Conus tendineus, Brug.	...	...
73.	" Santieri, Kien.	...	...	Tonga Islands.
74.	" vexillum, Mart.	...	...	Samoa Islands.
75.	" virgo, Lin.	...	...	Kingsmill Isl's.
76.	" vulpinus, Brug.	...	...	Caroline Islands.
77.	" varius, Lin.	...	...	Cook's Islands.
78.	" vermiculatus, Lam.	...	...	Society Islands.
79.	" sp.	...	...
80.	" sp.	...	...
81.	" sp.	...	...
<hr/>				
90 species.				
30 species.				
41 species.				
44 species.				
34 species.				
34 species.				
42 species.				
38 species.				
14 species.				
21 species.				
<hr/>				
Western Polynesia 64 sp.				
21 sp. not found in Eastern Polynesia.				
<hr/>				
Eastern Polynesia 57 sp.				
15 sp. not found in Western Polynesia.				
<hr/>				

1. CONUS ABBVS, Brug. We found two beautifully marked examples of this species washed up during a heavy gale at Rarotonga Island, Cook's group.
2. CONUS ABBREVIATUS, Nut. Not uncommon in the lower region of the littoral zone, and seems to be peculiar to the Sandwich Islands.
3. CONUS ADANSONII, Lam. Somewhat rare, and only occurred to our notice at the Viti Islands, where we found them lurking in sand at or near low water mark.

4. *CONUS AMMIRALIS*, Lin. During two years collecting in the Viti group we found only a single very perfect live example of this beautiful species, in sandy-mud in the upper region of the laminarian zone. Several small beach worn specimens were found in various parts of the group.
5. *CONUS ARENATUS*, Brug. Common at the Viti Islands, less so at the other groups, and very rare at the Cook's Islands; the limits of its range in Eastern Polynesia. Most generally found buried in coarse sand.
6. *CONUS AULICUS*, Lin. Very rare; no living examples found.
7. *CONUS AURATUS*, Brug. This is also a very rare species; found lurking under stones at low water mark.
8. *CONUS AUREUS*, Brug. Very rare; only found in the condition of dead shells.
9. *CONUS BULLATUS*, Lin. Only several dead but very perfect examples found on reefs.
10. *CONUS BALTEATUS*, Sow. Not common; found among seaweed near low water mark.
11. *CONUS COELEBS*, Hds. We obtained a number of examples of this species in the upper region of the laminarian zone, on sandy-mud bottom at the Island of Vanua Levu, Viti Islands.
12. *CONUS CANONICUS*, Brug. A rare species; found hiding under stones on reefs. The animal is flesh-white with a buff-yellow creeping disk, which, together with the upper surface of the foot is delicately marbled with rich reddish-brown, and the ends of the same organ edged or tinged with rose-red. The siphon and tentacles are white, the former tipped with rose-red and ornamented with an anterior transverse black spot.

13. CONUS CONSUL, Boiv.? Several dead but perfect examples found on an extensive sand flat on the south coast of Vanua Levu, Viti Islands. We are uncertain about the determination of this species. Boivin's description and figure agrees very closely with this shell. It is also very much like *Conus raphanus*, Brug., and may possibly be that species.
14. CONUS CAPITANEUS, Lin. This is not by any means a common species. We obtained a few examples on reefs in Western Polynesia.
15. CONUS CATUS, Brug. Found at all the South Sea Islands, except the Marquesas, and more plentiful at the Pammotus than elsewhere. Station, under stones on reefs.
The animal is pale cinereous, variegated with delicate brown mottlings, which are most conspicuous in the muzzle.
16. CONUS CLAVUS, Lin. A rare species; found under clumps of coral on reefs.
17. CONUS COCCINEUS, Gmel. Rare, and only found washed up on beaches. We received a few examples from Swain's Island, all beach worn.
18. CONUS CYLINDRACEUS, Brod. A very rare species; only occurred to us in the condition of beach shells. Besides the locations mentioned, we have ascertained that it is occasionally found in Flint's Island, which is also in Eastern Polynesia.
19. CONUS DISTANS, Brug. A common species at most of the South Sea Islands.

The animal is very timid and sluggish, of a purple brown color, with paler mottlings and darker veins. The siphon is white, variegated with purple brown spots. Mouth white, margined with brown; on reefs.

20. *CONUS ENCAUSTUS*, Rve. We obtained about a dozen examples of this species at the Marquesas Islands, where they occurred on a small shore flat.
21. *CONUS EBURNEUS*, Brug. Not uncommon on sandy bottoms in the upper region of the laminarian zone. We have found it more abundant at the Society Islands than elsewhere.
22. *CONUS EPISCOPUS*, Brug. Though having an extensive range through the South Seas, this is not by any means a common shell. Living examples were found under clumps of coral inside reefs.

The animal is creamy-white or creamy-yellow, mottled with reddish-brown, the mottlings disposed in transverse dashes on the upper surface of the foot, which is also marked with three anterior black spots; the end of the siphon and the tips of the tentacles rose-red, the former with a transverse black zone.

23. *CONUS ERMINEUS*, Born. Though having a wide range is not by any means common; on reefs.
24. *CONUS EXIGUUS*, Lam. We found two shells, dead, but in good condition, in the Viti group, which accord well with the description and figure of Lamark's species.
25. *CONUS FABULA*, Sow. A rare species, found under clumps of coral on reefs. Society Island examples are much finer and larger than those obtained in the western groups.
The animal is purple-red, minutely dotted with whitish, the dots more crowded on the tentacles.
26. *CONUS FIGULINUS*, Lin. Very rare. Two dead but perfect specimens found inside reefs.
27. *CONUS FLAVIDUS*, Lam. A common, somewhat variable species; found on reefs and stony bottoms.

Animal brownish-yellow; siphon diluted white, dotted with yellowish and zoned with black; upper surface of the foot reddish-brown, mottled and minutely speckled with brown.

28. *CONUS GENERALIS*, Lin. Only three dead examples found at Lauthala Island in the Viti group.

29. *CONUS GEOGRAPHUS*, Lin. Not common; only one living specimen obtained of a native at Samoa.

30. *CONUS GLANS*, Brug. Not common; under clumps of coral on reefs.

31. *CONUS HEBRALUS*, Lin. A common species; found on reefs and weedy grounds.

Animal blackish, the head tinged with red, and the foot, which is tinged with pinky-red anteriorly, is margined both above and beneath with tawny-yellow, and the creeping disk is marked with a middle longitudinal stripe of the latter hue; siphon grayish, tinged with pink and variegated with blackish.

32. *CONUS IMPERIALIS*, Lin. Not uncommon and found in the same station as the preceding species.

The animal is of a purple-red color, dotted with white and delicately mottled with black.

33. *CONUS MAPPA*, Crosse. This is *C. intermedium*, Rve., re-baptised by M. Crosse as Reeve's name is preoccupied for a fossil cone. This species seems to be rare; we only obtained several beach examples at the Panmotus, and received a specimen from Starbuck Island, which is also in Eastern Polynesia.

34. *CONUS LITERATUS*, Lin. On sandy bottoms in the upper region of the laminarian zone.

35. *CONUS LIVIDUS*, Brug. A common variable species; found on reefs and weedy and sandy bottoms.

The animal is deep purple-brown, delicately flecked with black and minutely dotted with white.

36. *CONUS LUTEUS*, Brod. We found one beach specimen of a cone at Kankora, Panmotu Islands, which we presume to be Broderip's species, which came from the same location.
37. *CONUS LEGATUS*, Lam. Very rare ; only three dead examples found.
38. *CONUS LICITOR*, Boiv.? We found two beach-worn shells at Samoa, which we doubtfully refer to Boivin's species.
39. *CONUS MAGNIFICUS*, Rve. A rare species ; found under stones.
40. *CONUS MAGUS*, Lin. Somewhat rare.
41. *CONUS MARCHIONATUS*, Hds. One dead and very much worn specimen picked up on the beach. It is said to be very rare at the Marquesas where it is peculiar.
42. *CONUS MARMOREUS*, Lin. Common in Western Polynesia, rare at the Cook's Group, and during seven month's research at the Panmotu Islands only found one very large living example. They are found living on sandy bottom, though sometimes on reefs.
43. *CONUS MILES*, Lin. Not uncommon on reefs.
44. *CONUS MILIARIS*, Brug. A common species; inhabiting reefs and sandy bottoms in shallow water.
The animal is of a whitish-buff color, with a few light reddish brown mottlings and dotted with flake-white; siphon white, tipped with pink, and varied with light brown.
45. *CONUS MILLEPUNCTATUS*, Lam. A common species ; living on sandy bottom in the upper region of the laminarian zone.
The animal has a tawny-yellow foot which is mottled beneath with purple-brown and varied with black and

brown above; the siphon is creamy-yellow varied with fawn-yellow, and marked at the anterior end with a wide transverse black band.

46. *CONUS MINIMUS*, Lin. Not uncommon at most of the South Sea Islands, and delight in sandy-mud bottom in shallow water.

Animal of a light-buff hue, more or less varied with reddish-brown, the siphon and either end of the foot tinged with rose-red.

47. *CONUS MITRATUS*, Brug. A rare species; found under clumps of coral on reefs.

48. *CONUS MUSTELINUS*, Brug. Also a rare species; found in the same station as the preceding.

49. *CONUS NANUS*, Brod. A common species; found on reefs.

Animal diluted white, closely dotted and pencilled with opaque white, and the tip of the siphon and ends of foot rose-red.

50. *CONUS NOCTURNUS*, Brug. Several examples found in shallow water on sand flats.

51. *CONUS NUSSATELLA*, Lin. Somewhat rare, and generally found hiding under clumps of coral on reefs.

52. *CONUS OMARIA*, Brug. Not common. Under stones on sand flats.

53. *CONUS PANNICULUS*, Lam. A rare species; only found in a dead condition on reefs.

54. *CONUS PERTUSUS*, Brug. Only two dead examples found on the reef at Anaa, Panmotu Islands.

55. *CONUS PRAEFECTUS*, Brug. Only several dead specimens found on a sandy-mud flat at Vanua Levu, Viti Islands.

56. *CONUS PULICARIUS*, Brug. An abundant species inhabiting sandy bottoms in shallow water, and more common in the Society Islands than elsewhere.

The animal has a tawny-yellow creeping disk, veined with darker; the siphon is yellow tipped with rose-red, and ornamented with a subterminal black zone and numerous abbreviated brown lines and opaque white dots. The muzzle is yellowish and transversely lineated with light brown; upper surface of the foot tawny-yellow with darker mottlings, veined and slightly clouded with black along the margins.

57. *CONUS PUSILLUS*, Chem. A common Sandwich Island species found on reefs and rocky coasts. A few examples occurred to our notice in the Viti Group.

Animal pinky-flesh color dotted and pencilled with opaque white, and the ends of the foot and siphon tipped with rose-red.

58. *CONUS PLANORBIS*, Born. A common species at the Society Islands, found on reefs, but much less abundant at the other groups.

The animal is rich buff-yellow, with darker veins on the foot, and slightly mottled with reddish-brown; siphon with a terminal zone of the latter color.

59. *CONUS PARVUS*, Pse. A rare species living under stones on reefs.

60. *CONUS PRAETEXTUS*, Roe. A few examples found on reefs and weedy gravelly flats.

61. *CONUS QUERCINUS*, Brug. Not uncommon on sandy bottom in the upper region of the laminarian zone. We found them more plentiful at the Society Islands than at the other groups.

The animal is of a tawny hue, closely freckled with black and white, the dots most crowded on the posterior part of the foot; siphon and mantle diluted white, the

former freckled with white and black, and tipped with pale rose ; the mantle exhibits a few marginated specks like those on the siphon.

62. *CONUS RHODODENDRON*, Couth. We found several beach-worn examples of this beautiful species at Rarotonga, one of the Cook's group, and received two larger specimens from Starbuck Island.
63. *CONUS SCABER*, Kien. Several examples occurred on reefs at the Kingsmill Islands.
64. *CONUS SOLIDUS*, Sow. A beautiful and somewhat rare species ; found under clumps of coral on reefs.
65. *CONUS SPONSALIS*, Chem. Common on reefs.

Animal pinky-white ; the ends of the siphon and both extremities of the foot intense carmine, and everywhere veined and punctulated with opaque white.

66. *CONUS STRIATUS*, Lin. Not uncommon, and most generally found on weedy and stony bottom. Our largest and finest marked examples were obtained at the Society Islands.

Animal creamy-white ; foot closely mottled with reddish-brown on the upper surface ; creeping disk tawny-yellow, varied with light reddish-brown ; siphon transversely pencilled with light brown ; head and tentacles more or less tinged with reddish-brown.

67. *CONUS TAHITENSIS*, Brog. Found at all the South Sea groups, but not plentiful ; on reefs.

Animal rich, dark olive-green, profusely freckled with black.

68. *CONUS TEREBRA*, Born. Though having an extensive range through the South Seas, it is not very plentiful ; on reefs.

The animal has a yellowish-brown foot, veined with deeper brown and a black spot marks the upper anterior

end; head ochre-yellow; siphon creamy-white, with two transverse black zones which are margined with orange-yellow.

69. *CONUS TESSELLATUS*, Born. We have invariably found this a comparatively rare species at all the groups except the Society Islands; and even the latter location only obtained them plentifully in *one* small strip of white sand, just below low water mark.

The animal is of a yellowish-white color, with the foot mottled with brownish-buff, and anteriorly spotted with black; the creeping disk is buff-yellow with darker veins; siphon creamy-yellow tinged with brown, edged with yellow, and a large transverse black spot marks the anterior end.

70. *CONUS TEXTILE*, Lin. Not uncommon; under stones on weedy bottom in the upper region of the laminarian zone.

71. *CONUS TULIPA*, Lin. Somewhat plentiful; under clumps of coral on reefs. When collecting at the Panmotus, I found three examples of this species, and held them in my hand while searching for other shells, when one suddenly threw out its long slender proboscis and punctured one of my fingers, causing sharp pain not unlike the sting of a wasp.

72. *CONUS TENDINEUS*, Brug. A rare species; only found washed up on sandy beaches.

73. *CONUS SANTIERI*, Kien. Not uncommon; under stones at the Marquesas, where it seems to be peculiar.

74. *CONUS VEXILLUM*, Mart. Somewhat rare; on reefs.

Animal deep olivaceous-black with a paler creeping disk, and the end of the siphon, together with the anterior end of the foot margined with olive-yellow.

75. *CONUS VIRGO*, Lin. Not very common and generally found on sandy bottom in the upper region of the laminarian zone.

The animal has a tawny-yellow colored foot edged with chrome-yellow, the disk clouded and veined with yellowish-brown, and its upper surface mottled and veined with light brown and black; muzzle creamy-white edged with chrome-yellow, and the latter transversely streaked with the same hue and ornamented with a transverse black zone; the margin is diluted white margined with chrome-yellow.

76. *CONUS VULPINUS*, Brug. Not uncommon on sandy-mud bottom in the upper region of the laminarian zone.

77. *CONUS VARIUS*, Lin. A very rare species; found under clumps of coral on reefs.

78. *CONUS VERMICULATUS*, Lam. Abundant on reefs at all the South Sea Islands.

79. *CONUS* sp. A single beach worn example found at the Marquesas, which I cannot refer to any species known to me. It is 37 mill. long by 20 in diameter, shaped like *C. mustelinus*; with about 40 closely-set transverse conspicuous elevated lines, but the normal colors have almost entirely disappeared.

80. *CONUS* sp. Several dead but tolerably perfect specimens found. In color and markings not unlike *C. omaria*, though only half as large. It may only be a variety of that species.

81. *CONUS* sp. A single immature example found on the reef at Huahine, Society Islands, is like an immature *C. virgo*. It is only 16 mill. long by 8 in diameter; color, excepting a few brown spots on the spire, uniform flesh tint under a thin, smooth horn colored epidermis; spire with eight volutions which are deeply striated.

The following species (unknown to me) are recorded from the Viti Islands:—

- Conus crassus*, Sow.
 - “ *Sowerbyi*, Rve.
 - “ *dilectus*, Gld.
 - “ *lemniscatus*, Rve.
 - “ *radiatus*, Gmel.
-

Since writing the preceding notes I find I have omitted to enter in the list *Conus emaciatus*, Rve., a common species which only occurred to my notice at the Viti Islands, where it was found on reefs.

The animal has the foot marbled with light and dark chestnut brown, its upper anterior end white, margined with yellow and marked with a black spot; head and tentacles pale yellow; siphon white, margined with lemon yellow and ornamented with two transverse black zones.

July, 1877.

COLONISING LAND SHELLS.

BY J. S. GIBBONS, M.B.

Some of our British species appear to partake of the colonising propensities of the English race. *H. aspersa*, Müll., is recorded from Brazil, S. Australia, &c., and I have found it at St. Helena and the Cape of Good Hope. *Z. cellarius*, Müll., is a still greater wanderer, and it also occurs at St. Helena, Madeira, and the Cape. These two species are not only widely diffused, but they are sometimes astonishingly prolific. I never saw *H. aspersa* so abundant as near Cape Town, while *Z. cellarius* occurs literally in hundreds in the space of a few square feet near a water-fall, St. Helena.

Jan., 1878.

NOTES ON *BULLIA RHODOSTOMA*, GRAY.

By J. S. GIBBONS, M.B.

The genus *Bullia*, Gray, is well developed in the S. African Seas, there being some 12 species inhabiting the sandy shores from low water to a depth of six or more fathoms. *B. rhodostoma* is by far the most common, occurring in vast numbers on the sands between tide marks. It appears to be confined to that part of the coast lying to the eastward of Cape Point, being replaced in Table Bay by a closely allied, but probably distinct species.

The animal has an extremely large foot, heart shape, very broad and thin, deeply cleft in front and of a pale, semi-pellucid, yellowish-grey color. In front rather above the lobes of the foot, and passing through the sinus in the shell is a long, tapering, very mobile, siphonal process, the edges of which are curved round so as to form an almost perfect tube; the mouth is between this process and the lobes of the foot.

The movements of the animal along the wet sands is rapid, and always within reach of the waves; it advances the two rounded lobes of the foot simultaneously, at the same time slightly drawing them together, and then drag; up the shell. The siphon is carried curled backwards, but fully half its length touches the sand; it is continually in motion, and serves to scoop and guide a small stream of water into the mouth. The animal does not confine itself to a straight course but turns in various directions, ploughing deepish furrows in the sands. It is very interesting to watch them crawling about in every direction, some large, some small, their peculiar mode of progression, by a series of quickly succeeding spurts, making the spectacle the more singular. Although destitute of eyes, they possess substitutes in a great sensitiveness to touch, and probably an acute sense of smell, and they are certainly more active and shew more intelligence (or its equivalent in the Mollusca) than most members of this class. When listed off the sands by

the shell, the animal twists its foot about, and on being replaced immediately bores obliquely downwards and disappears from view; the same happens when the shell is merely touched. If however the mollusk is lifted up and the *foot* touched, the animal ejects a small stream of water and then twists its foot up, so as to allow of its complete retraction within the shell, a small horny operculum closing the aperture. The animal buries itself, and does so partially when overtaken by a powerful wave, so as to prevent its being carried back into deep water.

Sometimes gigantic Medusæ, nearly a yard in diameter, are stranded on the shore; there is then a grand feast, numbers congregate on and around it, while others in the vicinity may be observed hurrying up open mouthed.

B. rhodostoma may be taken as the type of the S. African littoral species, of which there are several, but the deep water species are very different both in structure and habits.

PHOLAS CRISPATA, L., BORING IN METAMORPHIC ROCKS.

By J. S. GIBBONS, M.B.

I found the above species in considerable abundance in decomposing gneiss near Aberdeen. The live mollusk was not known to Macgillivray when he published his "Mollusca of Aberdeenshire."

A NORTHERN LOCALITY FOR *H. CANTIANA*, MONT.

By J. S. GIBBONS, M.B.

Newcastle is, I believe, the northern-most point for this species, there however it is supposed to have been introduced with ballast. Some years ago I collected it on the chalk cliffs of Bempton, near Flambro' Head, a locality so retired that it is impossible to suppose it otherwise than indigenous.

AN HOUR'S SHELL HUNTING IN CURACAO, W.I.

BY J. S. GIBBONS, M.B.

The West Indies are known to all Conchologists as a region in which land-shells are specially abundant. I have pleasing reminiscences of several of the islands and ports in the shape of numerous species collected during the few hours usually at my disposal, but no place equals St. Ann's, Curaçao, in my estimation, from a Conchological point of view.

The town itself is old and quaint—even abroad the Dutch endeavour to continue their home-habits and do their best to reproduce the canals and dykes of their native country, consequently, in St. Ann's water takes the place of pavement, and one employs a boat where in other places one would use a cab, or walk. I spent but little time, however, in investigating the peculiarities of the town, but hailing one of the things they call boats (for all the world like a square washing tub), I was sculled to the end of one of the few dry-land streets and struck out for the country. I had to pass along what a week or two before had been a street, parallel with, and close to the sea, but the greater part of which was in ruins from the tidal-wave of September 23rd. In some places the road was buried to a depth of six or seven feet under a mass of shingle thrown up on the beach: houses by the dozen were levelled to the ground and all bore more or less evidence of the terrific power of the wave. I thought to have found some marine shells washed up, but my time being very limited and noting that the soldiers (stationed at intervals of a few yards, with naked swords, to prevent plundering) were looking at me with suspicious eyes, I decided to push on for the country.

After all I never fairly reached the country. Near the outskirts of the town there is a hill on which are a few houses; here a waste piece of ground of very limited extent supplied me with occupation for all the time I had to spare. Covered with

masses of coral, neither grass nor water to be seen, the only vegetation consisting of a few stunted cacti and still fewer acacia bushes, this was so rich in shells that of several species enough specimens could have been collected in a few yards to supply, I should suppose, all the shell cabinets in the world. I have frequently collected a larger number of species during a single excursion, but never before seen so many individuals living in so limited a space of ground.

The stones, plants and ground were covered with *Strophia uva*, L. *Tudora megacheila*, P. & M., was in equal abundance, suspended by its silk-like thread from Acacia boughs, or strewed thickly along the ground underneath. A *Bulimulus* (*B. multilineatus* v. *Sisalensis*) abounded on the smaller boughs, while under masses of coral *Macroceramus inermis*, Gundl., *Pupa Parraiana*, D'Orb., and *P. pellucida*, Pfr., were abundant. In the loose soil *Cylindrella Raveni*, Bland, *Cistula Raveni*, Bland, and a curious *Cionella* were so numerous that a spade would have been the best instrument with which to collect them. I wasted a good deal of valuable time in separating them from the soil, when by simply taking away a few handfuls of mould, I might have obtained a larger number of specimens. A species of *Stenogyra* and a *Succinea* complete a list, all of which might have been gathered from almost any square yard of ground on the hill-side.

I cannot conclude this account without bearing evidence to the invariable kindly interest taken in the proceedings of a shell collector by the W. Indian negro—it is the solitary good trait I noticed in the race. In the above, as in many other shell-hunting expeditions, they were very useful. I shall not readily forget a scene in Georgetown, Demerara, where about half-a-hundred volunteers, of both sexes, assisted me in collecting *Ampullarias* from a ditch in one of the principal streets.

Dec., 1877.

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Notes on the *Helix sepulchralis* and its allies, with descriptions of two new species.—By G. FRENCH ANGAS, C.M.Z.S., F.I.S., &c. (P.Z.S., Nov., 1877, pp. 3 and plate.)

Mr. Angas has rendered in these notes good service to conchology by examining the fine series of Madagascar shells in the collection of Sir David Barclay, Bart., and differentiating the 4 distinct species that have hitherto been grouped under the name of *sepulchralis* of Ferussac.

M. Crosse had previously indicated one as distinct, under the name of *subsepulchralis*, differing from the true *sepulchralis* in its smaller size, more contracted umbilicus and banded periphery, the dark coloring showing also on the interior of the lip, while the concentric depression and coarse plication are absent.

The two remaining forms proposed for specific rank are :—

Helix hova. This is the *sepulchralis* var. *c* of Reeve, and bears some resemblance to the preceding species, and has three broad chesnut zones on a pale ground.

Helix sakalava. This species is known to some collectors as the var. *oliva-maculosa* of *sepulchralis* and is distinguished from that species by the absence of the oblique plications, the lower edge of the concentric depression being bounded by a prominent keel, the umbilicus being pinched and contracted and the epidermis freckled and diaphanous.

Three varieties of this species are described :—

Var. *a*. Shell white, with an olive-yellow epidermis.

Var. *b*. Shell pale green, with three brown bands and freckled with diaphanous markings.

Var. *c*. Shell pale yellowish-olive, irregularly painted with longitudinal brown flames.

J. W. T.

Die geographische Verbreitung der Mollusken.—

By W. KOBELT.

The admirable papers compiled by Dr. Kobelt on the terrestrial and fluviatile molluscan fauna of different regions are founded on the researches of the latest authorities. The prefatory remarks give the authorities for the different regions and the author's views on the peculiarities of distribution, &c.

In the first part, which is devoted mainly to the Atlantic Islands, the faunæ of the Azores, Madeira, Canaries, Cape Verde, Prince's Island, St. Thomas, Fernando Po, St. Helena, and South Morocco, the chief feature of which is their large number of endemic species, the total number of species being for the Azores 69 of which 33 are special forms, the most interesting feature being the *Vitrine* and *Craspedopoma*.

Madeira, which has a fauna far more specialized than the Azores, contains 161 species, of which 133 are peculiar or found nowhere else, the characteristic groups are *Leptaxis*, *Ochtophila*, *Tectula*, *Cionella*, *Craspedopoma*, &c.

The Canaries partake in common with the Madeiras of a marked special development of species; in a total list of 193 species, 167 are found only on those Islands, the predominant groups being *Hemicycla*, *Plectophorus*, and *Buliminus*.

The Cape Verdes produce a very meagre list having but 39 species, 27 being peculiar; *Leptaxis* is the prevailing genus.

Prince's Island contains 27 species of which 21 are peculiar. Here we find indications of more eastern affinities in the two species of *Nanina*, the *Achatina*, *Emea*, &c.

St. Thomas Island has 10 species, 8 of which are peculiar, *Nanina* being the prevailing genus.

Fernando Po has only 4 species of which two are *Achatinae*.

St. Helena has 18 species, 2 of the Helices have been referred to the Polynesian genus *Eudolonta* by some authors, while there are 5 *Achatinae*.

We trust that the able and learned doctor will continue from time to time the good work he has begun and of which this is the first part.

We may refer to the fact that the author of this valuable paper has recently been elected the first of ten honorary members of the Conchological Society of Great Britain and Ireland on account of his eminent services to the Science.

J. W. T.

**On the variation in sculpture of the genus *Nassa*.—
By F. P. MARRATT, May, 1876, 8vo., pp. 8.**

In this paper the author points out the improbability of the fixity and distinctness of species, as held almost universally by Conchologists and others some years ago. The great accessions made during the last few years to our knowledge of the variation and distribution of species have completely revolutionized our ideas on many questions relating to the Mollusca.

The variations as exhibited by the *Nassæ* are here fully discussed, the author's views favoring *Nassa semivirata*, *N. distorta*, *N. lachryma*, and *N. jacquiniana* being regarded as mere varieties of *Nassa monile*, Kiener. *N. tegula*, and *N. coronula* are simply different forms of one species. *N. canaliculata* and *N. lens* are identical, only differing in having open or closed sutures.

N. plicata, *N. pulla*, and *N. sulcifera* are varieties of *N. arcularia*.

N. lentiginosa, *N. punctata*, *N. velicata*, *N. compta* and *N. luctuosa* also are in all probability merely varietal forms.

N. gemmula is an exceedingly variable species, hardly any two specimens being exactly alike.

N. variabilis is also shown to be very variable and to include several species at one time considered to be quite distinct.

The linking of *Nassa* with other genera is next discussed, examples being named of an approach to *Rissoa* in *N. rissoides*, to *Phos* in *N. pallida*; *N. plicosa* is allied to *Strongyloceras*, *N. obliqua* to *Neritula*, *N. tritoniformis* to *Ranella*, &c.

This contribution by Mr. Marrat to our knowledge of the range of variation in the *Nassæ*, of which genus he has made a speciality, is important to all Conchologists who are interested in this fascinating branch of study.

J. W. T.

The Mollusca of the Firth of Clyde.—By ALFRED BROWN.*

The molluscan fauna of the estuary of the Clyde has for a long time past received a considerable share of attention from many eminent conchologists, partly on account of its intermediate position between the northern and southern provinces, and therefore harbouring many species which reach their most southern or northern limit in its waters, and partly on account of the numerous bays and lochs in which collecting may be carried on in almost all weathers, the great facilities for travelling and the beauty of the scenery have also no doubt tended to render this estuary a favorite hunting ground.

As might be expected several lists of the molluscan fauna have been published at various times by different investigators, but no reliable one has been published in recent years having the same scope as the very excellent catalogue now before us (the one

* Glasgow, 1878, royal 8vo., 130 pp., price 5/-, Hugh IIopkins, 85, Renfield Street.

recently published by Mr. Robertson embracing the whole area of the west of Scotland), which is intended as a guide to the mollusca of the Firth, as limited by a line drawn from the south end of Kintyre to the heads of Ayr.

No less than 353 species are mentioned in this work as having been recorded from the locality; of this number Mr. Brown excludes 63 as not sufficiently and satisfactorily proved to be inhabitants of the firth.

Of the 290 admitted species 2 belong to the *Brachiopoda*, 95 to the *Conchifera*, 2 to the *Solenoconchia*, 138 to the *Gastropoda*, and 3 to the *Cephalopoda*, the whole of which with the exception of *Rissoa abyssicola*, *Isocardia cor*, *Arca lactea*, *Litorina neritoides*, *Scalaria communis*, and some of the *Nudibranchs* have passed through the author's hands; the list may therefore be relied upon as thoroughly accurate and trustworthy.

The greatest care has been taken to exclude alien species, the difficulties in the way being considerably lessened by the stringent regulations preventing ballast being thrown into the channel by vessels entering the ports.

Two well known species (*Pecten islandicus* and *Saxicava Norvegica*) are occasionally found in a more or less perfect state, doubtless washed out of the glacial clays.

The nomenclature adopted is that of Dr. Jeffreys', the most important synonyms being given under the head of each species; those also are indicated that are known to have been found in the Scottish Post-tertiary deposits.

The habitats are given with a carefulness and accuracy that cannot be commended too highly, adding also considerably to the value of the work.

The British and foreign distribution is given fully, the foreign stations being authenticated by the names of the authorities being appended.

For the guidance of conchologists the best dredging stations and the most favorable times are precisely pointed out, full and lucid instructions as to the making of the dredge, the most approved methods of using it, with full particulars as to the outfit and accessory apparatus shown by experience to be necessary.

The work is concluded by a full and complete index to every generic and specific name mentioned in the volume.

We can cordially recommend Mr. Brown's very excellent and accurate work to all conchologists interested in the Scottish marine fauna or in the progress of science.

J. W. T.

Address delivered to the Biological Section of the British Association, Plymouth, 16th August, 1877.

—By J. GWYN JEFFREYS, L.L.D., F.R.S., Treas. G. & L.S.S., President of the Section.

This excellent and elaborate address which deals mainly with the results of those deep-sea dredgings that have marked an era in Conchology, and in which the learned author has taken an active and leading part, gives a list of 75 species, all of which have been dredged in depths exceeding 1000 fathoms, during the cruise of the *Valorous*, in 1875. Of the 75 species 3 are *Brachiopoda*, 39 *Conchifera*, 11 *Solenoconchia* and 22 *Gastropoda*; and of this number no less than 46 have been described by Dr. Jeffreys as new, and many of the remainder were previously known only by their fossil remains in the pliocene formation of Sicily and elsewhere, thus showing the marvellous distinctness of the fauna of the great depths that the recent researches have discovered.

In consequence of the greater depths that the past few years have shown life to abound, Dr. Jeffreys distinguishes two new

zones of depth—the “abyssal” for depths between 100–1000 fathoms, and “benthal” for depths of 1000 fathoms and more.

The author is of opinion that the distribution of the deep-sea mollusca is caused by submarine currents, and that the Arctic and Antarctic currents do not extend beyond the equator.

The theory of the continuity of the chalk which has had many able advocates, is discussed by Dr. Jeffreys in the two aspects of mineral composition, and the organisms belonging to each.

The Chalk consists almost entirely of Carbonate of Lime, while according to an analysis of the late Prof. D. Forbes of a sample of Atlantic ooze, procured from a depth of 1443 fathoms, it contained scarcely 50 per cent. of that substance; and one of its most able advocates, Sir Wyville Thomson, admits that more careful examination shows important differences.

The organisms considered by Dr. Jeffreys are naturally the Mollusca regarded by Lyell as the “highest or most specialized organisms” on which geological reasonings are founded.

The apparent resemblance of the abyssal and benthal ooze to the ancient chalk has led geologists to the conclusion that the chalk fauna had lived in deep water. From a list prepared by Mr. Etheridge for Dr. Jeffreys and reproduced in the address, it is apparent that all the genera enumerated in the list were comparatively shallow water forms, not a single *Leda*, *Pecchiolia*, *Næra*, *Bulla* or any of the *Solenocochlia* occur in the upper or white chalk although they inhabit the deep sea zone and especially characterize the modern deposit, Mr. Woodward also remarks that the crustacea of the chalk are shallow water forms.

The white chalk is in many places composed of *Globigerinae*, &c., all of which inhabit at present the surface of the sea. According to Dr. Wallich, *Globigerinae* are found in all latitudes and at all depths ranging from 50–3000 fathoms.

In conclusion, Dr. Jeffreys expresses his inability to refer a single species of cretaceous mollusk to recent forms, and deprecates the modern theory of evolution as unsupported by facts, which appear rather to favor devolution or succession.

To all conchologists and geologists we would recommend a careful perusal of this deeply interesting and important address, containing, as it does, the carefully digested and tabulated results of some of the most important scientific expeditions of modern times.

J. W. T.

DESCRIPTION OF A NEW SPECIES OF *PLANORBIS*.

BY W. NELSON.

Planorbis (Gyraulus) Gibbonsi (Pl. IV., f. 3).

SHELL depressed and somewhat concave in the middle, above and below; rather thin, of a light horn color, closely and finely striate in the line of growth, *epidermis* rather thin, *periphery* rounded, *whorls* $3\frac{1}{2}$, somewhat rapidly enlarging, the last flattened below, as broad or broader than the rest of the shell and deflected near the aperture, *suture* deep and distinct, mouth broadly elliptical, the two ends equally rounded, *peristome* thin and continuous, *umbilicus* very shallow.

Diam. 0.175; alt. 0.045.

Hab. "On decaying vegetation in a stagnant pool, Zanzibar." (Gibbons.)

This very distinct species is nearly allied to *Planorbis glaber*, Jeff., but may be easily distinguished from it by the flattened whorls. It has also some affinity, judging by the description and figure, with *Planorbis Natalensis*, Krauss.

Mature specimens are thickly incrusted.

This *Planorbis* was discovered by Mr. J. S. Gibbons, to whom I have much pleasure in dedicating it.

July, 1878.

NOTE ON ABNORMAL FORM OF *CYLINDRELLA*.

By J. T. MARSHALL.

I think the abnormal form of *C. Raveni* noticed in the *Quarterly Journal of Conchology* for May, by Mr. J. S. Gibbons, is to be accounted for by a piece of grit or a small pebble filling up the natural aperture and thereby necessitating the structure of another mouth. I have observed it in species of *Clausilia*, and also in the marine *Littorina*, though more rarely. In the latter case I account for it by the periwinkle falling and getting wedged in the crevice of a rock, when it would have to exercise its ingenuity in constructing another mouth or submit to starvation.

July, 1877.

NOTE ON A LIST OF SHELLS TAKEN AT
GUERNSEY, &c.

By J. T. MARSHALL.

Will you allow me to point out an error in the otherwise excellent paper contributed by Messrs. Cooke and Gwatkin in the *Quarterly Journal of Conchology* for May last? They give *Cochlesma pectenoides* as occurring at Herm: but this species has never been met with in the Channel Islands, and what they probably did find was *Thracia papryacea* var. *villosa* (Margill.) (*T. villosa*, F. & H.) The latter differs from *T. pectenoides* in being much less depressed, not smooth or glossy, and in the absence of the peculiar spoon-like osseous or hinge which is characteristic of *T. pectenoides*. It inhabits the coralline zone, and after a storm is frequently cast up at Herm and other sandy beaches, as its fragility and buoyancy enable it to be easily transported.

July, 1878.

LIST OF WEST AFRICAN SHELLS.

(Continued.)

BY F. P. MARRAT.

		Other localities.
145	Venus affinis, <i>Sow.</i>	
146	„ lyra, <i>Hawley.</i> Corisco Bay.	
147	V. (<i>Circomphalus</i>) plicatus, <i>Gmel.</i>	
148	V. do irregularis, <i>Reeve.</i>	
149	V. (<i>Tapes</i>) dura, <i>Gmel.</i> Corisco Bay.	
150	Donax n.s. Cape Palmas.	

This small and very abundant shell was sent to the British Museum and stated by Mr. E. Smith to be new.

151	D. acutangulus, <i>Desh.</i>	
152	Mactra (<i>Trigonella</i>) opposita, <i>Desh.</i>	
153	Pecten gibbus, <i>L.</i> Corisco Bay.	
154	Avicula chanon, <i>Adanson.</i> Corisco Bay.	
155	Terebra (<i>Myurella</i>) variegata, <i>Gray.</i>	
156	Defrancia sinuosa, <i>Montf.</i>	
157	Murex (<i>Rhinocanthus</i>) tumulosus, <i>Sow.</i> Cor. Bay.	
158	Do. moqueanus, <i>Duval.</i> Corisco Bay. China? <i>Duval.</i>	
159	M. (<i>Phyllonotus</i>) varius, <i>Sow.</i>	
160	Fusus (<i>Hemifusus</i>) morio, <i>L.</i>	
161	Nassa (<i>Niota</i>) totombo, <i>Adanson.</i> Aust., Mosambique.	
162	Nassa (<i>Telasco</i>) interstincta, n.s. Corisco Bay.	

N. testa oblongo-turrata, nitidissima, levigata, flavescente, maculis subquadratis fulvis seriatim et transversim ordinatis, zonata; anfr. convexis, ultimo ad basin sulcata, infra suturas sulcatis; columella leviter callosa, alba; labro incrassato, intus lirato.

This elongated shell is certainly one of the most beautiful in this genus, it is allied to the *N. labiosa* of Sow., *N. variabilis*, Phil., *N. sesarma*, Marrat, from Whydah, and *N. vincta*, Marrat.

Its resemblance to the genus *Bullia* is rather remarkable.

Purpura (Stramonita) gigantea, Reeve. A very variable shell and probably a variety of *P. hæmostoma*, L., of the same coast.

163 *Fasianella* Reevi, *Jonas*. Locality not recorded before.
Corisco Bay.

164 *Turritella (Torcula) carinifera*, Sam. Cor. Bay.

Grassatella Africana, n.s.

Crass. testa trigona, subdepressa, epidermide fibrosa, molluscula, induta; transversim sulcata, sulcis profundis, irregularibus, umbonibus depressiusculis; latere antico rotundato, postice subangulato.

Long. 12; Lat. 12½ Lines.

Hab. W. Africa.

Actinobolus Africanus, n.s.

Act. testa oblique ovata, turgida, inæquilateralis, ventricosa, radiatim costata, costis viginti, rotundatis, nodulosis; umbonibus prominentibus, obliquis; alba vel pallide rufo-fusca, epidermide fusca.

Long. 9; Lat. 8 Lines.

Hab. W. Africa.

July., 1878.



LIST OF MOLLUSCA COLLECTED AT MUSCATINE,
IOWA, U.S.A.

BY PROF. F. M. WITTER.

Helicidæ.

HELIX (HYALINA) ARBOREA, Say. Abundant in all localities where any protection is afforded. It seems to be somewhat gregarious. I have found 20-30 specimens crowded together in hibernation.

H. MINUSCULA, Binn. Common with *arborea*.

H. FULVA, Draparnaud. Somewhat rare; wide spread, in damp woods; shell fragile.

H. LINEATA, Say. Rare, but widely distributed; under old logs in damp woods or deep ravines.

H. (MACROCYCLIS) CONCAVA, Say. Rare. It appears to prefer dry or nearly dry woods; Wyoming Hills, and also R.R. embankment, one mile N. of Muscatine.

H. ALTERNATA, Say. Common in many localities; seems fond of loam rather than leaves or decaying wood.

H. STRIATELLA, Anthony. Very rare; R.R. one mile N. of Muscatine. It is abundant in a deposit of Loess in this city. I found it 20-25 feet below the surface, well preserved along with *Helix pulchella*, Müll. (not found here now), *Succinea avara*, Say, and *Pupa (armifera?)*, Say.

I find it under vines and large rose bushes in one small spot on R.R. embankment. It seems to be about extinct here.

H. LABYRINTHICA, Say. Very rare; in this city in a grove on bank of Mississippi river. I found it somewhat more abundantly near DesMoines, Iowa.

H. *HIRSUTA*, Say. Common along R.R., N. of Muscatine, on Cedar river, 10 m. N.W. of Muscatine and on DesMoines river near DesMoines.

It appears to thrive in damp grass where there is very little timber, as well as by old logs in woods.

H. *MONODON*, Rackett. Rare here, common near DesMoines.

Var. LEAI. Common here with *striatella* and *hirsuta*.

H. *ALBOLABRIS*, Say. Rare here; found in deep ravines 8-10 miles S.W. of Muscatine; on Cedar river in damp forests and very abundant in one locality near DesMoines.

Our *albolabris* is a well marked variety. It is white, sometimes with a slight tint of rose; shell thin, rather smaller and striae more delicate than the specimens from Ohio and further east.

H. *MULTILINEATA*, Say. This is our characteristic species of the genus. On most islands in the Mississippi river not subject to overflow, this shell abounds. In some places it is very abundant. It inhabits damp forests where there is abundance of decaying leaves. Our specimens are very robust, and extremely variable in markings and color. A var. which might be called *alba* is found here about one in fifty. I found one small region where this var. constituted about one in four.

Another var. apparently arising from the crowding of the red or brown lines so closely as to blend, giving the shell a dark red or brown color, might be called *rubra*.

In 1875, Oct. 31st, I found this species hibernating on Geneva Island 4 miles E. of Muscatine. They were under logs, thick leaves and in the sand with little else over them. In one spot in this city I found two or three specimens of this species small and lighter colored, a sort of dwarf. I have some shells that measure as follows:—height 17, greatest diam. 30, least 25 mm.

H. THYROIDES, Say. Very rare. I found on Wyoming Hills 20 or more dead shells, in good condition. They appeared to have hibernated together and the spot became dry during the winter and they all died. I have not found them elsewhere, nor in this locality alive.

H. CLAUSA, Say. Rare here; abundant near DesMoines with *albolabris*. It seems to avoid the islands and seeks damp ravines. It is a fine little shell.

H. PROFUNDA, Say. Rare here in Iowa. Nearly opposite this city in Illinois at one place called Gooseberry Point, I found a few specimens. It is found with *clausa* near DesMoines but rather scarce. A white var. frequently occurs.

H. PULCHELLA, Müll. Not here alive; fossil in Loess in this city.

LIMAX CAMPESTRIS, Binney. Abundant under boards in gardens, in woods; everywhere in damp places where protected from the sun.

CIONELLA SUBCYLINDRICA, Linn. Abundant on R.R. embankment one mile N. of Muscatine; have found it nowhere else. It seems to live just below the surface of a sandy loam under vines.

PUPA PENTODON, Say. Under damp and decaying leaves by old logs in woods.

P. FALLAX, Say. Abundant in one small region. I have found it in a space not more than 10 feet square, by a slight exposure of sandstone in a very damp spot about the roots of a small stump, just on the border of a little prairie. It seems to be entirely confined to this spot.

P. ARMIFERA, Say. Abundant and widely dispersed; prefers sandy loam among grass roots, near old logs in woods. I have not seen it on river bottoms or on islands. Fossil in Loess in this city.

P. CONTRACTA, Say. Abundant along with *armisera*.

P. CORTICARIA, Say. Common with *contracta* and *armisera*. It prefers beds of old leaves not much decayed but damp.

It may be found between the leaves. Some of my correspondents pronounce my *corticaria* to be *Carychium exiguum*. It is certain it never reaches any damper places than the *Pupas*, with which it is associated.

SUCCINEA OVALIS, Gould. Abundant in marshes, by margins of ponds; associated with *Limnaeas*; shell fragile.

S. AVARA, Say. Somewhat rare; closely associated with *C. subcylindrica* and found most abundantly in same region.

It prefers rather loamy, loose earth, which it seems to penetrate the same as *C. subcylindrica*. It is abundant as a fossil in Loess in this city.

S. OBLIQUA, Say. Abundant on Geneva Island with *H. multilineata*. They are closely alike in habit.

Shell much stronger than *ovalis*; they do not seem to be hermaphrodite.

Philomycidæ.

TEBENNOPHORUS CAROLINENSIS, Bosc. Rare; about old stumps or decayed logs; a fine mollusk.

Limnaeidæ.

LIMNÆA REFLEXA, Say. One variety abundant in swamps with flags or reeds. The typical *reflexa* is scarce.

L. REFLEXA var. ZEBRA. Abundant in this vicinity. This var. is generally marked by white or light bands along the lines of growth alternating with dark or brown of usual color of

shell. It is much shorter and more conical than *reflexa* proper. Another var. of *reflexa* is found near West Liberty, in this county, with a peculiarly inflated or contorted aperture.

This var. approaches *reflexa* in size and general appearance except the aperture.

L. DESIDIOSA, Say. Were very abundant in a small pond near this city. The pond is on Mad Creek bottom and in times of very high water the creek runs through the pond. Two years ago an unusual freshet occurred and seemed to wash away every shell from the pond and I have found them nowhere else. The specimens I found there are very fine; dark epidermis, which however may not be the real color; 10 mm. long.

L. CAPERATA, Say. Common; foot of animal yellowish, too large to be entirely withdrawn in the shell; light horn color, body-whorl tumid, a sort of open umbilicus, aperture lateral, about 15 mm. long; muddy margins of ponds.

PHYSA GYRINA, Say. Rare. Our *Physas* are so variable in form I am hardly certain about any of them; grassy ponds.

P. HETEROSTROPHA, Say. Abundant along the margins of our ponds. I found a remarkably tumid var. very fragile, crawling about, under and over the ice in the spring.

PLANOREIS TRIVOLVIS, Say. Abundant in all our ponds.

P. EXACUTUS, Say. Abundant in some ponds. Last spring, soon after the ice melted, I found thousands of them floating on the water in what is known here as the Pond-Lily Pond. They soon disappeared and have been difficult to find since. They all look black.

P. DEFLECTUS, Say. Abundant in Muscatine Slough and Keokuk Lake. They are covered with hairs apparently in regular rows. The shell is certainly closely like *P. albus*.

P. BICARINATUS, Say. Common; hard to find alive; seems to spend most of its time on muddy bottoms of nearly all of our ponds.

P. PARVUS, Say. Common in all ponds where *Nelumbium luteum* grows.

SEGMENTINA WHEATLEYI, Lea. Common, much like *P. bicarinatus* in habitat and habit. I seldom find it alive, but find good specimens floating along margins of ponds.

ANCYLYS FUSCUS, Adams. Muscatine Slough and Keokuk Lake. Not very common; on smooth sticks or logs that have lain in the water a year or more.

Valvatidæ.

VALVATA TRICARINATA, Say. Abundant in our ponds and sloughs in the woods. A well marked var. with spire elevated and rather more robust than the former with a low spire or none. They do not seem to inhabit the same ponds.

Viviparidæ.

VIVIPARA INTERTEXTA, Say. Abundant in Muscatine Slough and found sparingly in several other ponds and sloughs. Young shells covered with short hairs in regular rows and seemingly crossing each other, giving the appearance of a woven fabric; some shells have a slight tendency to bands running with the sutures; mature shells dark-brown, or black.

MELANTHO SUBSOLIDA, Anthony. Abundant in Mississippi river and Muscatine Slough. I find the shells from the ponds and sloughs to differ slightly from those in the river, yet I can hardly believe there is a specific difference. It

appears to me our pond *Melanthro* is called by some, *decisa*. It is lighter, more pointed, and whirls not so much shoul-dered as the river form.

LIOPLAX SUBCARINATA, Say. Common in ponds; some shells are not carinated and can scarcely be separated from the pond *Melanthro*. Typical specimens are bluish horn color and strongly carinated.

Rissoidæ.

BYTHINELLA OBTUSA, Lea. Rare; in a few ponds in woods; shells all apparently truncated.

SOMATOCYRUS ISOGONUS, Say. Common in ponds or sluggish streams.

AMNICOLA PORATA, Say. Common with *S. isogonus*.

A. CINCINNATIENSIS, Anthony. Abundant with *porata*, and in some ponds where the latter does not occur.

Strepomatidæ.

PLEUROCERA SUBULARE, Lea. Abundant in lower end of Burdett's Slough at time of low water last summer; previously I had found but a few dead shells along the river shore.

Unionidae.

ANODONTA CORPULENTA, Cooper. Common in our sloughs and Keokuk Lake. Rather tumid, short, lower margin quite convex. This species somewhat resembles *grandis* into which I believe it varies.

A. GRANDIS, Say. Abundant in Keokuk Lake. Shell longer, straighter on lower margin, less tumid than the typical *corpulenta*. The young of these two species seem to be much more readily separated than the mature shells.

I have specimens of *grandis* nearly 20 cm. long
Shells thin, as all our pond bivalves are.

A. EDENTULA, Say. Common; Mississippi river.

A. FERUSSACIANA, Lea. Very rare here. I have found dead
shells along the Mad Creek, but no live one here.

I have good specimens from Honey Creek, Delaware
County, Iowa.

A. IMBECILIS, Say. Abundant in all our sloughs.

A. SUBORBICULATA, Say. Common in Keokuk Lake; a fine but
fragile shell. This lake is the expansion of Muscatine
Slough, a body of water formerly connected with the
Mississippi river on the Iowa side in this city, winding
away from the river 4-5 miles, and widening some 4 miles
S.W. of us into Keokuk Lake, and at a distance of about
18 miles reaches the river again. The lake is 4-5 feet
deep, about 2 miles long and 1 mile wide, largely filled
with *Nelumbium luteum*.

MARGARITANA COMPLANATA, Barnes. Common; Mississippi river,
and sloughs connected therewith. DesMoines river, Mud
Creek, &c.

M. CONFRAGOSA, Lea. Very rare; Mississippi river, DesMoines
river.

M. MARGINATA, Say. Rare; Mississippi and DesMoines.

M. RUGOSA, Barnes. Rare; Mississippi and DesMoines.

M. DESTITUTA, Rare. I find dead shell with *Anodonta fer-
ussaciana* along Mad Creek, and it is found in Honey
Creek with the same *Anodonta*. I have not found it alive.

UNIO ALBUS, Green. Abundant; Mississippi river and DesMoines.
Shell thick, light color.

U. ALATUS, Say. Common; Mississippi. Young shells are hard,
some; interior fine nacreous purple. We have a var.
somewhat rare, much heavier, longer, little or no dorsal wing.

- U. ANODONTOIDES, Lea. Common; Mississippi. Very smooth, salmon color.
- U. ASPERRIMUS, Lea. Common; Mississippi. Variable in form, passing one way into *pustulatus*, Lea, and the other into *lachrymosus*.
- U. CAPAX, Green. Very rare; Mississippi. Drab color, very tumid, high umbones; a fine shell.
- U. CORNUTUS, Barnes. Abundant; Mississippi. Varies greatly in color, some dark green and handsomely marked, others light and not the slightest traces of green or epidermal markings.
- U. CRASSIDENS, Lamarck. Rare; Mississippi. Closely related to *ligamentinus*, Lamarck on one side, and *gibbosus*, Barnes, on the other. Purple inside and dark epidermis, 12.7 cm. long.
- U. EBENUS, Lea. Abundant; Mississippi.
- U. ELEGANS, Lea. Common; Mississippi and Cedar. Varies the same as *cornutus*, also the interior white, rose, &c. Green epidermis beautiful, seems to run into *trigonus*, Lea.
- U. ELLIPSIS, Barnes. Abundant; Mississippi. Closely like *higginsii*, Lea.
- U. GIBBOSUS, Barnes. Common; Mississippi. Almost always dark purple inside but varies to white, commonly very convex on dorsal edge and concave on ventral, but sometimes straight and difficult to separate from *rectus*, Lam.
- U. GRACILIS, Barnes. Abundant; Mississippi and Cedar. Shell generally very thin, epidermis from fine green rays to a light color, interior white to purple, generally a dorsal wing, teeth very light.
- U. GRANIFERUS, Lea. Common; Mississippi. Very thick, purple inside.
- U. HIGGINSHI, Lea. Common; Mississippi. Silky epidermis, dark rays from umbones, interior generally fine salmon color,

male disk elliptical, female quadrate and more tumid. It is probably *orbiculata*, Heild.

U. LÆVISSIMUS, Lea. Common; Mississippi and Cedar. Polished flesh-colored epidermis, thin, purple inside, dorsal wing; seems to prefer sandy bottom.

U. LIGAMENTINUS, Lamarck. Abundant; Mississippi, Cedar, Iowa, and DesMoines. Variable in form and color, epidermis strongly rayed with green, and inside bluish white, red rays equally strong, and inside rose to purple. Shell heavy; some forms difficult to separate from *luteolus*, Lam.

U. LUTEOLUS, Lamarck. Abundant in Cedar and DesMoines but rare here. I have found it in the Mississippi and in Muscatine Slough below Keokuk Lake. Extremely variable in form and color; from long and slender beautifully green rayed to tumid, truncated, yellow. Difference in form is no doubt due in great part to sexes. It seems to vary to *ovatus*.

U. METENEVRUS, Rafinesque. Abundant; Mississippi. A beautiful shell, quite variable in form.

U. MISSISSIPPIENSIS, Conrad. Abundant; Muscatine Slough. Light, dark green to black, sexual difference well marked. Seems to avoid running water. Closely related to *nasutus*, Say.

U. OCCIDENS, Lea. Common; Mississippi. Very tumid, beautifully green rayed, light salmon to pink inside; old shells much eroded. Same form as *capax*.

U. PARVUS, Barnes. Rare; Muscatine Slough, ponds generally; associated with *Anodonta imbecillis* and *Unio mississippiensis*; length 3.7, width 2 cm.

U. PLICATUS, Barnes. Abundant; Mississippi. Very heavy; but two or three well marked folds, folds sometimes almost wanting; purple about posterior adductor scar and along posterior margin; rather globular.

- U. *RUSTULATUS*, Lea. Common; Mississippi. Variable in form, chestnut with dark concentric lines; some almost free from pustules.
- U. *PUSTULOSUS*, Lea. Abundant in Mississippi, found also in Cedar and DesMoines; distinguished from *pustulatus* by green on umbones, this character seems to be very constant.
- U. *PYRAMIDATUS*, Lea. Common; Mississippi. Resembles *trigonus* when young.
- U. *RECTUS*, Lamarek. Abundant in Mississippi, is also in Cedar and DesMoines. Young shells are very beautifully green rayed, old nearly black; interior from salmon, rose, to white. 13.5 cm. long.
- U. *RUBICINOSUS*, Lea. Very rare; Mississippi, Cedar and DesMoines. It seems to be very closely related to *trigonus*, Lea.
- U. *SECURIS*, Lea. Common; Mississippi. The young are very beautiful, light epidermis with radiating black spots.
- U. *TRIANGULARIS*, Barnes. Common; Mississippi. Sexes well marked.
- U. *TENUISSIMUS*, Lea. Rare; Mississippi. Very thin and fragile, resembles young *gracilis*; sexes quite unlike.
- U. *TRIGONUS*, Lea. Common; Mississippi. Light brown color, inside white to rose, umbones high and curving; thick, somewhat globular, slightly sulcate posteriorly from umbones to margin.
- U. *TUBERCULATUS*, Barnes. Common; Mississippi and DesMoines. Young, fine dark green; shell attenuated posteriorly, thickly covered with tubercles.
- U. *UNDULATUS*, Barnes. Rare here, abundant at DesMoines. Differs from *plicatus* in having more and stronger folds, not so tumid, and umbones scarcely rising above ligament. I am not certain it is found here. It is certainly a var. of *plicatus*, as the latter varies in all the particulars enumerated.

U. WARDII, Lea. Rare here, common in the Cedar and Des Moines. It is a var. certainly of *metinevus*. It is a beautiful shell.

U. ZIGZAC, Lea. Common; Mississippi. I do not see clearly the difference between this species and *denaciformis*, Lea.

It may be we have both here; if so one is doubtless a var. of the other.

Corbiculidae.

SPIRÆRIUM STAMINEUM, Conrad. Abundant in ponds and slow running water.

S. TRANSVERSUM, Say. Common with *stamineum*.

S. SPIRÆRIUM, Anthony. Common in ponds in woods.

PISIDIUM COMPRESSUM, Prime. Rare. In ponds in woods.

Jan., 1878.

NOTE ON THE GEOGRAPHICAL DISTRIBUTION OF TERRESTRIAL MOLLUSCA.

BY W. G. PETTERD.

I have perused with considerable pleasure and instruction the excellent article in the *Q.J.C.* for November, 1877, by C. P. Gloyne, entitled, "Remarks on the Geographical Distribution of Terrestrial Mollusca." Of course it could not be expected in such a wide field as the title offers that the author could go minutely into the details of the peculiarities of distribution in each region. As far as he has gone it is remarkably good; nevertheless I do not think a few additional general remarks concerning the Australasian Province would be altogether uninteresting, or that the author will think me intrusive. A task of this sort must of necessity contain some little deficiencies or even errors that it is possible for those who have had local experience to expand or

rectify. With this idea I send these rough notes, which in themselves may not be perfect; I think, however, they will explain a little more.

The Moluccan Region.

D. *New Guinea.* I have visited the southern coast of this great and interesting Island and lived a considerable time on the coast of the great Eastern Peninsula, occasionally penetrating into the interior in the direction of Mounts Owen Stanley and Astrolabe. Generally speaking, I was surprised and disappointed at the comparative barrenness of the country so far as Land Shells are concerned, although the rich tropical vegetation exists in many parts in the same profusion and luxuriance as in the Solomon and other adjacent Islands, but the land Mollusca offer a very marked contrast, both as regards number of species and their profusion individually.

I visited Katow, on the coast opposite to Cape York, the most northerly extremity of Australia, in the "Chevert" expedition. The general aspect of the country here is one universal Mangrove Swamp extending for many miles in either direction, formed by what appears to be the delta of the Great Fly River. On the banks of the rivers a dense, rank vegetation is ever present, while the coasts, and in many instances the banks of the rivers, are invariably fringed with the Malaria-breeding Mangrove. The land shells collected here are described in the "Proceedings of the Linnean Society of New South Wales for 1876," by Mr. J. Brazier, viz.:—*Helix (Thalassia) annulus*, *H. (Geotrochus) Strabo*, *H. (Geotrochus) siculus*, *Helicina Maino*.

At Yule Island on the eastern side by the Gulf of Papua, separated from the mainland of New Guinea by Hall Sound, the following were collected:—*Helix (Thalassia) sappho*, *H. (Discus) Lomonti*, *H. (Conulus) Maino*, *H. (Conulus) Starkii*, *H. (Geotrochus) Yulensis*, *H. (Geotrochus) Brazieriæ*, *Bulimus Macleayi*, *Tornatellina terrestris*, *Pupinella Crossei*, *Helicina Coxeni*; and on

the mainland *H. (Geotrochus) zeno* and *H. Broadbenti*. The latter extends to Port Moresby. The aspect differs greatly from the West of the Gulf of Papua—at Katow there are bold lofty mountain ranges flanked by hills of various altitudes. In fact there is a total change in the aspect, not only as far as the physical appearance, but the natives also differ, for here we have the yellow skinned Polynesian, at Katow and to the west the natives belong to the Black Papuan race.

At Port Moresby about 75 miles south-east of Hall Sound, I made a lengthy stay with three companions collecting specimens of Natural History, visiting the coast villages, and collecting in their immediate vicinity and making short journeys into the interior. The full length of the coast of the Peninsula is traversed by a low range of hills, seldom more than 300 feet in altitude, of modern tertiary origin, covered with the debris of corals and shells apparently of species existing on the coral reefs adjacent; they are consequently very dry and bare of vegetation, except coarse grass and straggling dwarf Eucalypti. In the indentations a few more shrubs and trees struggle for an existence, and here and there in the gulleys where a greater quantity of alluvium has accumulated, a denser scrub exists. On this coast-range land shells are almost totally absent, in fact I could only find, after diligent search, a single dead specimen of a small *Helix*, apparently the widely diffused *Helix rustica* of Australia. Beyond the coast-range the country is a general undulating plain, covered with high coarse Eucalypti and an occasional patch of tropical verdure around water-holes and on the banks of creeks. These plains are also destitute of Land Molluses, that is so far as I could observe, although a few fresh-water shells exist, viz:—one small sp. of *Unio* bearing a great resemblance to a sort I have collected in the Richmond River, New South Wales; one sp. of carinated *Physa*, one sp. of *Melania*, and one *Amphipepla* closely allied to a Queensland form.

A high mountain range traverses the centre of the Peninsula, being a continuation of the Great Northern range—the back bone of New Guinea—occasionally reaching an elevation of 17,000 feet. Here a magnificent tropical verdure is ever present, in the deep and extensive ravines and along the banks of the rivers and streams that rush with great velocity through the rugged ranges. The spurs of the hills that abut the mountains are generally sharp and razor-backed, covered with high rank grasses and straggling Eucalypti. On the brows of these the native tracks run, and often in traversing these a single false step would precipitate the unfortunate traveller over 100 feet down into the gorge on either hand. I need scarcely mention that the scenery is grand in the extreme—high precipitous mountains, deep gorges and rushing torrents—but one breathes a pestiferous air that soon reduces the white man to a skeleton and the grave. This is the home of the exquisite Bird of Paradise, Racquet-tailed Kingfishers, Cassowary, the magnificent Goura Pigeon and many other forms of the feathered tribe that have gained for New Guinea a reputation *par excellence* for the beauty of its Natural productions. But here again, the Land Shell collectors would meet with disappointment, although every favourable condition exists Land Shells are of extreme rarity both in variety and numbers. Nevertheless, what I did obtain were very interesting forms. One species of *Helix*, *H. Broadbenti*, has a very striking resemblance to the common *H. Fraseri*, and the four other sorts of *Helices* that I collected, resemble Phillipine Islands' forms to a very marked degree. In these mountains I only got one specimen of an operculate shell, and this is dead. This I sent you for description in the little lot by post.

From this rough sketch it may be seen that although we may expect, as further research proceeds, to have a great augmentation to our knowledge of the Land Mollusca of South east New Guinea, we cannot expect it to produce anything like the rich

array of lovely forms so abundant and characteristic of the Phillipine Islands or the Solomon Archipelago.

The great drawback to exploration in New Guinea is its deadly climate, and, for the most part, hostile character of the Aborigines; both are formidable drawbacks, the latter particularly, for they are not the low, degraded savage of Australia, but a muscular, stalwart race of formidable opponents. This is instanced by the fierce opposition that D'Albertis lately met with in his collecting expedition to the Fly River, which resulted in the loss of almost all his servant ; but I regret to have to add the management of the party casts no creditable reflection on that man, no matter how much our knowledge of the Zoology of that part of the *terra incognita* may be augmented by his collections.

The West Polynesian Region.

A. *The Solomon Islands.* I may state the remarks concerning the richness of this division are quite correct. During a cruise through the Islands I was amazed not only at the great variety of sorts but also the individual abundance of species. The natives brought off to the vessels literally bushels of Land Shells, that are the ornaments of the collector's cabinet, to barter them for pipes, red cloth, tobacco, beads, and such like native wealth, happy to give hundreds of superbly coloured *Natica* for a single common clay pipe. I think it would surprise many English collectors to have seen those nude painted savages with white-washed mops of hair, elaborate ornaments of platted grass and human teeth, with the lobe of the ear stretched nearly to the shoulder and a large plug of carved wood inserted, embellished with any amount of talking and gesticulation, in thin, long, narrow canoes trying to make a bargain for a few beads in exchange for a basket of beautiful land shells. If they could see the original collectors of their treasures in their native home they would be no little surprised.

I have not had the pleasure of visiting the Phillipine Islands, but I can scarcely think that land shells can be in greater profusion there than in these islands, and yet much remains to be done for our knowledge of many of the groups is extremely meagre.

Australian Region.

B. Tasmania. This island is much richer in land mollusca than is generally known. The species numerically cannot amount to less than 100. They include a few fine and remarkable forms, besides the *Helix Launcestonensis* mentioned, there is *Bulimus Dufresnii* and *Vitrina Milligani*, both remarkable forms having no representatives on the mainland of Australia, unless the Victorian *Helix atramentaria* can be said to be the analogue of the latter, as it is the Australian representative of the peculiar *H. Bushyi* of New Zealand. Among the minute shells may be mentioned *H. vitrinaformis*, a curious form of a *Vitrina* like appearance, and *H. dispar*, the only species with a tooth in the interior of the aperture, both discovered by me on Mount Wellington, in the southern part of the island. More recently I have found a minute reversed *Helix*, (*H. Weldi*, Tenison Woods, "Proceedings of the Royal Society of Tasmania"); this is the only sinistral species hitherto discovered in Australia, nevertheless the general facies of the smaller species resemble the smaller forms from Southern Australia, and their apparent distinctness may be due to the paucity of collectors in this department in the sister colony of Victoria. I may state that I am now compiling a complete Monograph of the Land Shells of this Island, including descriptions of my new discoveries. This I hope to present to your readers in a short time.

The fresh-water shells have been catalogued by the Rev. Tenison Woods, but the work will require thorough revision. Much also remains to be done, for even since the publication of this list several new forms have been described at the meetings of the Royal Society of Tasmania, including a species of *Gundlachia*,

G. Petterdi and many that were supposed to be restricted in their habitat to the southern part of the Island, have been found to be generally diffused.

In conclusion, I must congratulate the author on the excellence of his paper, and I hope other observers in various parts of the world will take this important matter in hand and still further elucidate the "Geographical Distribution of Terrestrial Mollusca."

May, 1878.

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The Marine Shells obtained during the "Chevert" Expedition.—By JOHN BRAZIER.

(From *Proc. Lit. Soc., N.S.W.*, 1876.)

The activity of Mr. Brazier during the voyage of the "Chevert" may be gleaned from the fact that in the four notices of the marine shells obtained, published up to the present, no less than 305 species are recorded.

This rich harvest has not only added in a great degree to our knowledge of geographical distribution in this comparatively unknown region but a number of very interesting and novel species have been discovered and are described by the author, viz.:—

Drissa Mastersi, Spaldingi; Clathrella Ramsayi, Barnardi, Macleayi, triplex; Murex eximus, Ocenebra confusa, Epidromus Anayasi; Marginella levigata; Anachis clathrata; Amyda mariae, inscripta, merita, pudica, abyssicola; Astyris lecia; Turbonilla Darnleyensis, eximia, aplini, confusa; Odostomia clara, affinis, compta, polita, parvula; and Syrnola pulchra.

In addition to this lengthy and interesting list of new species 24 others are mentioned, of which only single or mutilated specimens were obtained.

J. W. T.

MOLLUSCAN THREADS.

A Paper

READ BEFORE THE BIRMINGHAM NATURAL HISTORY AND
MICROSCOPICAL SOCIETY.

By G. SHERIFF T.Y.E.

"So the spider spins,
And eke the silkworm, pattern'd by ourselves."—HOOD.

Montagu, at the beginning of this century, noticed the habit in *Physa fontinalis* of thread-spinning. He says: " *Physa fontinalis* spins a filament by which it lets itself down from the surface after floating." Later, Mr. Robert Warington* gave an exceedingly interesting account of this thread-spinning by *Limnaea glutinosa*, *L. stagnalis*, various species of *Planorbis* (not named by him), and *Physa fontinalis*. The latter upon one occasion formed a thread so tough that he was enabled to lift the snail seven inches above the surface of the water by it. The author includes in his list of thread-spinners *Neritina fluviatilis*—of this I shall speak further on—and concludes by stating his belief that "all the freshwater snails are possessed of this power."

Now, after this well-proven fact of spinning, stated upon the authority of so good an observer, you would scarcely expect to find such an observation as this:—"The Physæ, especially *P. hypnorum*, are active in habit, whether swimming foot uppermost, on the surface of the water, holding themselves stationary at different depths in the water, or gliding through it in sudden jerks by an hydraulic action of the foot. By bringing the lateral margins of this organ into contact, the animal constructs a tube for inhaling and suddenly expelling the water either upwards or downwards. Montagu stated, and the statement has been repeated by Jeffreys, that the animal spins a mucous thread for letting itself down in

* *Zoologist*, 1852, pp. 3634-5; 1853, p. 4533.

the water and rising again for respiration ; but I have not succeeded in confirming this observation, and have great doubts of its accuracy."*

Mr. Reeve does not tell us how he proved his assertion about the "hydraulic action of the foot," and does not seem to have tried to ascertain how they "hold themselves stationary at different depths in the water,"—coolly "doubts" Montagu's statement about the "mucus thread," and does not notice Mr. Warington's observations at all. I may state that a mollusk is only capable of "holding itself stationary at different depths in the water" when attached to a thread, and that no "hydraulic action" of the foot takes place. When a mollusk is forming a thread, the "lateral margins" of the foot are brought together, forming a channel for the natural flow of mucus down the sides of the foot to the tail; thus adding to the thread, which is gradually extended. The existence of a thread may be proved, as stated by Mr. Warington, by passing a rod under the creature, by which means it can be swayed to and fro.

I have taken great interest in this thread-spinning, and long before I had read Mr. Warington's excellent notes I had been observing this seeming phenomenon, and had tabulated the species absolutely seen by myself in the act, and noted the conditions under which mollusks are capable of producing and using a thread.

Let me here explain that the words *thread* and *spinning* are used descriptively, and it must not be supposed that these threads, or the production of them, bear any analogy to the spinning of spiders. In the case of the mollusk the thread is gelatinous—in fact, is formed of the slime of the creature, the process of forming it being, to a certain extent, an involuntary act, although it is used for a set purpose; whereas the spider's thread is silken, and its formation is entirely under the control of the creature. Neither are they to be confounded with the byssal filaments of the *Mytilidae*,

* Lovell Reeve, "British Land and Fresh-water Mollusks," pp. 150-1, 1863.

Pectinidæ, Dreissena polymorpha, &c., these latter being of a fibrous nature, and the product of a special organ.

As members of the order *Pulmonobranchiata*—breathers of atmospheric air—spin and use threads oftener than any other of the Gasteropoda, especially the aquatic members of the group, and as their method of using them differs from the *Pectinibranchiata*—water-breathers—we will consider them first.

In order to be better understood, let me describe briefly their process of respiration. On the side of the creature is situated a sac, or branchial chamber, formed by a fold in the mantle, and having an opening outwards, which the animal can open and shut at will. The air in this sack is renewed by diffusion while the mollusk is at the surface of the water, which air oxygenates the blood through the veins, which ramify in an arborescent form over the roof of the cavity. Now it will be obvious to the reader that when this sac is distended with air, the creature becomes of less specific gravity than water; hence it will float, even against its own will, when dislodged from its hold; and, on the other hand, when the air in its branchial chamber is exhausted by natural respiration, or expelled by reason of some annoyance, the creature, becoming heavier than water, at once sinks to the bottom; and on this simple fact hangs the capability of the mollusk to spin an *upward* or *downward* thread.

I have never seen a member of this order *descend* by a thread unless it had first *ascended* by one, in which case it might return upon the same thread. It would no doubt be possible for it to descend by a thread if its air-chamber was sufficiently empty to allow of it sinking; but, atmospheric air being essential to the creature's existence, it very rarely voluntarily descends without a supply, and *never in such a case by a thread*, although it will creep about in the water when the air in its branchial cavity is sufficiently exhausted to allow it to fall to the bottom of the water when loosed from its hold.

As soon as a young Limnoid issues from the egg it appears to be capable of rising to the surface of the water by a thread, its air-sac being no doubt sufficiently charged with air to render it buoyant enough.

The method of anchoring these threads to the surface of water is singular: a minute concavity at the upper end acts like a small boat, and thus sustains the thread.

When one of these mollusks descends by the thread it spun in ascending, it generally carries back the thread with it, gathering it together by a muscular action of the foot, although these threads are sometimes fixed and made to last a considerable time. The longest threads I have seen are those of the Physæ, and I have had in a vessel containing fourteen inches depth of water, a number of them fixed by *Physa hypnorum*, up and down which they were creeping for eighteen or twenty days together. I have no doubt they extend their threads to a much greater length, say three or four feet.

Permanent threads are kept in position and strong enough for use by the addition of a film of mucus each time a mollusk crawls over them; and I may here explain what I wish to convey by saying that the process of spinning is to a certain extent an involuntary act.

When a snail crawls (either a terrestrial or an aquatic species) it leaves behind it a trail of mucus, which is discharged for the purpose of lubricating the foot in its passage over any surface, and if the continuity of this mucus be not ruptured, we have a thread in all respects analogous to those I am speaking of.

In the case of an aquatic species, this trail of mucus is usually invisible; hence it may be supposed that mollusks inhabiting water do not secrete such a copious supply as their brethren of the land, and that the water itself would act as a sufficient lubricant; but such is not the case, for not only do the bodies of mollusks

require lubricating in their passage through water (as in the case of fishes), but the foot especially, in its passage over the surface of any object. This mucus may readily be seen when fresh water is put into any vessel in which mollusks have been kept for a few days, as the bubbles of oxygen then given off by the plants (*Anacharis ultimatum* shows it well) adhere to the network of mucus which stretches from leaf to leaf, making it plainly visible: of course the change must be conducted gently. The best plan is to lift out a bundle of Anacharis from the vessel in which the snails are, and drop it gently into a vessel of fresh water.

The Slugs possess this mucus-secreting property to a remarkable degree; each species produces mucus of a color and consistency peculiar to itself, some species being provided with an important slime-gland near the tail. This property is essential to their well-being; having no sheltering shell, it serves to keep the body moist and cool in dry weather. Slugs often suspend themselves by a thread, and sometimes use it as a means of ascent.

The Pectinibranchs, extracting oxygen from the water as it passes over their comb-like gills, are not capable of altering their specific gravity; I have not even one spin an upward thread; but several species, both fluvial and marine, often suspend themselves from the surface of the water or from a floating object by a thread. The same remarks apply to the Nudibranchs.

Instances of thread-spinning occur among the Lamellibranchiate mollusca.

The late Dr. Lukis, of Guernsey,* whose name is a household word to all lovers of science, and whose kindly heart endeared him to all who ever had the pleasure of his acquaintance, in several most excellent letters to Dr. Jeffreys, which every naturalist may take as models of careful and loving observation, says, in speaking of *Sphaerium lacustre*—“When they reach the edge of

* Jeffreys’ “Brit. Con.,” vol. i, p. 12 et seq.

the water, they take to the surface easily, and creep along slowly, and apparently with caution, as if in search of some floating substance, near which they will rest for hours. . . . The foot during repose is usually retracted, and does not seem necessary for mere floating purposes."* "I have this morning watched one, which had reached the surface, spin its filament and descend to half an inch below the surface, where it remained suspended for some time. It occupied three hours in spinning this short thread. I think it consists of more than a single filament. . . . The surface of the water was again depressed or cupped." He states that the filaments vary from one to four, were far apart in one instance, but rarely could more than one thread be seen; and that the animal has the power of raising itself to the surface again by means of its thread.

M. Bouchard-Chantereux has recorded that the young of *S. cornueum* possesses the same power of spinning a thread. I have myself seen the latter anchor itself by a mucus filament. The uses of these threads to the Pulmonobranchs appear to be:—

1st. They enable the mollusk to reach the surface of the water gently when no other means present themselves, and to return to its original station, which it often does, after having ascended to the surface of the water and opened its branchial valve for the entrance of more atmospheric air.

2nd. It is a much easier method of locomotion.

3rd. It is a much quicker mode of travelling; for if the surface traversed be smooth, as the side of a glass vessel, it will take the mollusk twice the time to creep as to float by a thread, while if the surface be uneven, as the sides of a pond or the leaves of a plant, it would be longer still in creeping.

4th. As a great part of the lifetime of the Limnæidæ, especially the Physæ, is spent in floating upon the surface of the water,

* Without doubt they are kept afloat by the mucus cable.

where they feed upon particles of decaying vegetable matter, this property of thread-spinning seems admirably suited to their requirements.

It enables the Slugs to descend from considerable heights, as from branch to branch of a tree, quicker and easier than by the process of creeping.

Messrs. Binney and Bland* describe, I think very correctly, the use of the thread to the *Cyclophoridae*—"As the operculum prevents the animal, when at rest and retired within its shell, from adhering by means of its foot, as is usual with the *Helicidae*,† the animal has the power of spinning a short thread, which is attached to the object of support. By this it hangs suspended at pleasure."

Among the Pectinibranchs, it enables the snail to reach the bottom gently, instead of falling roughly or suddenly. It serves the same purpose among the Nudibranchs.‡

The Sphaeridae, through their capability of climbing and floating, in which exercises they are fond of indulging, especially when young, are enabled to enjoy a more extended range of habitat and food; and when during their excursions they desire to rest, this mucus-cable (always short, generally hardly to be spoken of as of any length, but simply a mucous attachment) keeps them safely moored, while, with foot and siphons withdrawn, they take a short period of repose.

* "Land and Fresh-water Shells of North America, part iii, p. 96,
Washington Smithsonian Institution, September, 1865.

† When a *Helix* wishes to attach its shell some distance from the ground, to a wall or tree, its method of procedure is interesting and curious.—Having attained the desired spot, it shrinks itself partly within its shell, leaving only the foot, which is shrunken, projecting; it then exudes mucus from the edges of the mantle, which becomes attached to the object of support and to the edge of the mouth of its shell, it then withdraws further into its shell, leaving only the tip of the posterior end of the foot attached, remaining thus until the film of mucus has hardened, when it withdraws entirely into its shell. I have observed this many times, both in English and North American *Helices*. I have not seen a *Helix* or a *Bulimus* use a thread in any way.

‡ Alder and Hancock, "Monograph of the Nudibranchiate Mollusca."

Having thus far, I hope, succeeded in indicating the "why and the wherefore" of molluscan threads, I will tabulate the species I have seen spin and those seen by others, commencing with the species that spins oftenest and best, and relate one or two incidents connected therewith.

Pulmonobranchiata.

Physa hypnorum.—As before stated, I have had the young of this species creeping up and down permanent threads for eighteen or twenty days together. In one case I saw three Physæ and a *Limnaea glabra* upon a thread of the former at one time. Often, when two Physæ meet upon the same thread, they fight as only mollusks of this genus can, and the manœuvres they go through upon their fairy ladders outdo the cleverest human gymnast that ever performed. I once saw one ascending, and when it was half way up the thread it was overtaken by another; then came the "tug of war"; each tried to shake the other off, by repeated blows and jerks of its shell, at the same time creeping over each other's shell and body in the most excited manner. Neither being able to gain the mastery, one began to descend, followed by the other, which overtook it, reaching the bottom first. Yet they are not always bent upon war, but pass and repass each other in an amicable spirit. One of the most beautiful sights in molluscan economy is to see these little "golden pippins" gliding through the water by no visible means; and when they fight, to see them twist and twirl, performing such quick and curious evolutions, while seemingly floating in mid-water, is astonishing, even to the patient student of Nature's wonders.

If when one of these mollusks is ascending by a thread, it be disturbed sufficiently to cause it to descend before reaching the surface of the water, it changes the point of attachment of its thread from the tail to the head, by bringing its extremities together, the alteration of position being attained with great dexterity and ease.

Physa fontinalis stands next as a thread-spinner, using the thread in a similar manner but not so often.

Limnaea glabra, although not using this means of locomotion so often, nevertheless spins well and easily.

L. stagnalis is active when young, but its habit of spinning decreases as it grows older.

L. palustris.—The same remarks apply to this species also, although I have not seen it spin so commonly as *stagnalis*.

L. peregra.—This species has been observed to spin by my friend Mr. R. M. Lloyd, but it very seldom uses a thread.

L. glutinosa, recorded as a thread-spinner by Mr. Warington.

Planorbis complanatus, *P. spirorbis*, *P. contortus*.—These species spin very much less often than the foregoing.

Some species of *Cerithidea* inhabiting salt marshes and Mangrove Swamps suspend themselves by a number of glutinous threads out of the water, e.g., *C. decollata*,* L., Borneo.

Mr. Thomas Hoy† seems to have been one of the earliest observers of this method of travelling as practised by the slugs, and he has given an account of one he saw hanging from a Pine tree by a filament four feet long, and travelling towards the earth at the rate of one inch in three minutes. At the same time Dr. Shaw gives an instance (from a memorandum made in 1776) of a slug descending from the roof of an arbor, the extraordinary distance of eight feet, until it nearly touched the ground, when he shook it off.

Limax arborum.—M. Bouchard-Chantereux has seen young individuals of this species descend from branch to branch of a tree by a mucous filament, and he supposes this species to be the *Limax filans*, or spinning slug of some English authors of the

* Woodward, "Manuel of Mollusca," p. 243, 1868.

† Trans. Linnean Soc., vol. i, p. 183 et seq.

last century. Mr. Daniel has also seen this species suspended in couples from the branches of trees during the breeding season.*

Mr. Wm. Harte,† F.R.G.S.I., has recorded some interesting experiments he made with *Limax arborum*, causing it to spin a thread and to *reascend* by it, and he believes that from the "perfect ease and regularity with which they do it, that they are well accustomed to it." Mr. Harte also states that if the Slug be "gorged with food," the slime is thin and not able to sustain it; but "if kept overnight without food, it performs well next morning." This is a very interesting fact as shewing that when the creature is in a condition when it would be likely to require the thread most, viz., hungry and in search of food, it is in a condition best suited to produce it; and this further strengthens my belief (contrary to Mr. Harte), that the thread is used as a means of *voluntary* descent, although, as I have endeavoured to explain, the production of it is to a certain extent *involuntary*. When in search of new feeding grounds, during its excursions, it would often come to the edge of an object and launch itself into space upon the chance of finding a landing again soon, or if it did not, returning to its old one.

Dr. J. Gwyn Jeffreys speaks of the use of the thread by *Limax agrestis*, and I have myself seen it use its thread for the purpose of descent.

Limax maximus has been observed to lower itself a distance of three or four feet by a thread.‡ I once saw two fine specimens of this species suspended on a wall by a thread made very strong by the joint exudation of the Slugs, being nearly $\frac{1}{2}$ inch in thickness at the base, nine inches long, and capable (as I proved) of bearing a very much greater weight than their own. I have also

* Jeffrey's Brit. Con., vol. i, pp. 136—7.

† Proceedings Dublin N. H. Soc., vol. iv, part ii.

‡ Lovell Reeve, "British Land and Fresh-water Mollusks," p. 26.

seen *Arion hortensis* hang itself by a thread from a twig, and I feel satisfied that it is a habit common to all the Slugs.

The observations of Mr. Binney,* the eminent American Conchologist, upon the Slugs of his native country, are of such interest that I cannot refrain from quoting considerably from them. He says "All the species which have yet come under our notice possess the power of suspending themselves in the air by a gelatinous thread. . . . During the whole operation the locomotive disc is in active undulatory motion, in the same manner as when in ordinary progression. It appears in this way to guide and force toward the extremity the mucus which is secreted on its surface, and which, collected at its extreme point forms the thread. The Slug often pauses in its descent, and extends its tentacles and its whole body in various directions, as if seeking some object on which to make a lodgment. . . . It is mostly however when they are young, or at least not grown to their full size, that they enjoy this power† . . . They often remain suspended in mid-air for a time, and it is not unlikely that there is some pleasurable sensation in the act, which induces them thus to prolong it. We have seen the descent practised by every one of our Atlantic species." The two American species of the peculiar genus *Zebennecphorus*, Binney, are included in his list.

Megalomastoma suspensum, mentioned by Guilding‡ (now called *M. Guildingianum*, Pfr.), derived its first name from its habit of suspending itself from the branches of trees by a thread.

My excellent correspondent Mr. J. S. Gibbons, M.B., to whom I am indebted for much information and many specimens of the

* L. and F.-W. shells of N. A., part i, pp. 8-9, Washington Smithsonian Inst., 1869.

† This is the case with all Mollusks, so far as I have observed.

‡ Guilding, quoted by Woodward, "Manual of the Mollusca," p. 209.

mollusks of South Africa and the West Indies, has given me the names of two species which he has seen suspended by a thread, "very thin but exceedingly strong and silk-like, issuing from between the operculum and outer lip." Their names are *Chondropoma plicatum*, Pfr., found at Puerto-Cabello, "thread $\frac{1}{3}$ to $\frac{1}{2}$ -inch long," and *Tulora megacheila*, P. & M., found at Curaçoa, "thread much shorter."

Chondropoma dentatum,* Say, Florida, has the same habit.

Mr. William Nelson, who is an accurate observer of the habits of the mollusca, tells me that Mr. John Dixon, of the Leeds Infirmary, has seen several individuals of *Clausilia rugosa* var. *dubia*, suspended.

Pectinibranchiata.

Bythinia tentaculata.—This snail suspends itself by a thread, after floating, which is usually attached to the surface of the water.

Rissoa parva is well known to conchologists as a thread-spinner. Dr. J. Gwyn Jeffreys thus pleasantly speaks of it:—"Lying on a rock, by the brink of a seaweed covered pool left by the receding tide, it is no less pleasant than curious to watch this active little creature go through its different exercises,—creeping, floating, and spinning."

The following species of *Rissoa striatula*, *R. cancellata*, *R. abys-sicola*, *R. membranacea*, *R. vitrea*, *R. pulcherrima*; also *Odostomia Warreni*, *Barnea rubra*, *Eulima intermedia*, *Cerithium reticulatum*, *Cerithiopsis tubercularis*, and *Pleurostoma nebula*. An account of their different modes of procedure will be found in Dr. Jeffreys' work, under their several headings.

Litiopa, a genus of small mollusks living on the Gulf-weed, are said to use a mucus filament for the purpose of regaining their station, after being swept off the weed. Their method of pro-

* L. and F. W. shells of N. America, part iii, p. 96.

cedure has been described by Dr. Geo. Johnston.*—“The creature spins a thread of the viscous fluid that exudes from the foot, to check its downward fall, and enable it to gain the pristine site. But suppose the shock has severed their connection, . . . the thread is still made available to recovery. In its fall, accidental or purposed, an air-bubble is emitted, which rises slowly through the water, and as the snail has enveloped it with its slime, this is drawn out as the bubble ascends; and now, having a buoy and ladder whereon to climb to the surface, it waits suspended until that bubble comes into contact with the weeds that everywhere float around.”

If this be correct, we have a water-breathing mollusk using its thread as a means of *ascent* after having spun it downwards. This would be analogous to the use of the thread by the Slugs. I have not myself seen a member of this order use its thread against the laws of gravitation.

With regard to the spinning of *Neritina fluviatilis*. This species is an inhabitant of running streams, and will not live long in confinement. Its structure renders it impossible for it to spin an *upward* thread, as the nature of its habitat alike precludes it, and as it could not float in running water, it could not therefore spin a *downward* thread, as obtains with other members of its order. While making these observations, I do not discredit Mr. Warington's statement, because, although the act of floating is not a normal one with the creature, it might have performed it as mollusks sometimes do,† when placed under circumstances which allow of it, albeit in their natural condition they could not possibly do it; and if it floated, there is no reason why it should not have spun a *downward* thread.

* Johnston, “Introduction to Conchology,” p. 134, 1850.

† For an account of this habit in *Trochus occidentalis*, a deep-sea species, see Jeffrey's “Brit. Con.,” vol. 3, pp. 335-6.

Having kept nearly every British species of the Limnæidæ in confinement on purpose to observe their habit of spinning, and not having seen some species use this means of locomotion at all, others seldom, and some often; some when young but less often as they grow older, and others all their lifetime, I have been led to advance a theory whereby to account for this varied use of these threads. To this end I have drawn up the following table. While writing it, I am sensible of its imperfections; but if it only serves as a nucleus to stimulate other observers of the economy of these creatures to frame a more perfect one, I shall be the more satisfied with my attempt.

Doubtless all the *Limnæide* are more or less experts in the use of the thread, and in the pellucid stillness of their own domain, when the eye of man is not present to pry into their daily avocations, this beautiful and delicate method of travelling is often used by them.

Planorbis lineatus.†—Inhabiting streams; could not spin a thread in its native habitat. I have not succeeded in keeping it alive long.

Planorbis nitidus,† *P. nautilus*,† *P. albus*,† *P. glaber*,† *P. vortex*,† *P. spirorbis*,* *P. contortus*,* *Limnaea truncatula*.†—Of these species some spend their lives on vegetation near the surface of ponds or pools, and others inhabit shallow ponds or ditches, which sometimes become dry in summer; hence the necessity for using a thread does not often occur.

Planorbis carinatus,* *P. complanatus*,*—Living in the larger ponds and pools where the water is of considerable depth, this capability of thread-spinning often serves them to good purpose.

Physa hypnorum,* *P. fontinalis*,* *Limnaea glabra*,*—Inhabiting deep ditches, ponds, or pools, and fond of indulging in sub-

* Species I have seen spin a thread.

† Species I have kept, but not seen spin.

‡ Species seen to spin by others.

aqueous excursions, the habit of spinning is essential to their mode of life.

Limnea stagnalis, * *L. palustris*, * *L. auricularia*, † *L. peregra*, † *L. glutinosa*, ‡ *Planorbis corneus*. †—When full grown these species, being much larger and stronger than any of the foregoing, are able to traverse more ground in a given time; hence they do not feel the necessity of using a thread so often as the smaller species.

If any of my readers wish to see for themselves this habit of travelling, as used by the mollusca, let them take a few adult *Physa hypnorum*—a species which may be found very early in the spring, and throughout the year, following

“The melancholy feet
Of him that is the father of decay,
Spoiling at once the sour weed and the sweet.”

place them in a glass vessel with some small pebbles at the bottom and a little weed, which should lie at the bottom, so as to allow a clear space for the threads between it and the surface of the water, and keep them until they deposit spawn. As soon as the young are free from the spawn mass they will commence spinning, and practice it so often that the process may be seen at any time.

I have only now to add that the nomenclature of the British mollusks named in this paper is that of Dr. Jeffreys (Brit. Con.). Where a foreign species is mentioned the authority is given.

Feb., 1878.

* Species I have seen spin a thread.

† Species I have kept but not seen spin.

‡ Species seen to spin by others.

DISTRIBUTION OF *CREPIDULA ACULEATA*,
GMEL.

BY J. S. GIBBONS, M.B.

At page 335 of the *Q.J.C.* Mr. Garrett alludes to the occurrence of this species in several widely separated parts of the world. West Africa, Patagonia, and the East and West Coasts of South America may be added to the list there given of recorded localities. Specimens collected by me in the West Indies and at the Cape of Good Hope do not differ materially from Peruvian shells. It is difficult to account for this great diffusion. Some have suggested that it has been effected through the agency of ships and floating logs, but the depth at which the animals live does away with the possibility of the last being a means, and its abundance wherever found, renders it highly improbable that ships can have produced such results. Another theory, but, so far as I am aware unsupported at present by observed facts, is that of the late Dr. Gray. He is of opinion that the apparently large geographical distribution of some members of the genus, is owing to species possessing a similar variety in different localities; the general form of the shell and the structure of its surface being influenced by the depth of water and the character of the substance to which it is attached.

June, 1878.



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